



ADAPTATION FUND

## **REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND**



**Project proposal: Harnessing the water-energy-food nexus to  
address and adapt to climate change impacts in Tawi-Tawi**



## FULLY DEVELOPED PROPOSAL FOR SINGLE COUNTRY

### PART I: PROJECT/PROGRAMME INFORMATION

**Title of Project/Programme:** **Harnessing the water-energy-food nexus to address and adapt to climate change impacts in Tawi-Tawi**

**Country:** Philippines

**Thematic Focal Area:** Water Management

**Type of Implementing Entity:** Multilateral Implementing Entity

**Implementing Entity:** United Nations Industrial Development Organization (UNIDO)

**Executing Entities:** United Nations Industrial Development Organization (UNIDO), Mindanao Development Authority (MinDA)

**Amount of Financing Requested:** 7,432,196 (in U.S Dollars Equivalent)

**Letter of Endorsement (LOE) signed:** Yes  No

**Stage of Submission:**

This proposal has been submitted before including at a different stage (concept, fully-developed proposal)

This is the first submission ever of the proposal at any stage

In case of a resubmission, please indicate the last submission date: [Click or tap to enter a date.](#)

## Contents

PART I: PROJECT/PROGRAMME INFORMATION .....	2
Contents .....	3
List of tables .....	3
List of figures .....	4
Abbreviations .....	4
Short summary of the project .....	5
Project Background and Context .....	5
Project Objectives .....	16
Project Components and Financing .....	16
Projected Calendar .....	17
PART II: PROJECT / PROGRAMME JUSTIFICATION .....	19
A. Description of the project components .....	19
B. Economic, social and environmental benefits of the project .....	28
C. Analysis of the cost-effectiveness of the proposed project .....	30
D. Consistency with national or sub-national strategies and policies .....	32
E. Relevant national technical standards and environmental standards .....	35
F. Duplication with other funding sources .....	36
G. Learning and knowledge management .....	39
H. Consultative process .....	40
I. Justification for funding requested .....	46
J. Sustainability of the project outcomes .....	47
K. Overview of the environmental and social impacts and risks .....	49
PART III: IMPLEMENTATION ARRANGEMENTS .....	52
A. Arrangements for project implementation .....	52
B. Financial and project risk management .....	54
C. Measures for environmental and social risk management .....	56
D. Monitoring and evaluation arrangements .....	56
E. Results framework for the project proposal .....	57
F. Alignment with the Results Framework of the Adaptation Fund .....	63
G. Detailed budget .....	64
H. Disbursement schedule .....	66
PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY .....	68
ANNEXES .....	70
A. Environmental and Social Impact Assessment Study .....	70
B. Consultation report .....	70
C. Gender Assessment and Gender Action Plan .....	70
D. Letter of Endorsement from the Designated Authority .....	70

## List of tables

Table 1. Project components and financing .....	16
Table 2. Projected calendar .....	17
Table 3. Quality parameters as typical of seawater and the desired drinking water standards .....	21
Table 4. Component 1 activities and outputs .....	24
Table 5. Component 2 activities and outputs .....	26
Table 6. Component 3 activities and outputs .....	27
Table 7. Component 4 activities and outputs .....	27
Table 8. Component 5 activities and outputs .....	28
Table 9. Cost estimation for the infrastructure and equipment for the water system .....	30
Table 10. Cost estimation (CAPEX, OPEX) and estimated water price for the desalination facility .....	31
Table 11. Cost of the intervention per beneficiary .....	32
Table 12. Linkages of the RETS project with the proposed adaptation project .....	37
Table 13. Summary of synergies and duplications with other projects .....	38
Table 14. List of stakeholder consultations for the preparation of the project concept .....	40
Table 15. List of stakeholder consultations for the preparation of the full project proposal .....	42
Table 16. Justification for funding .....	47

Table 17. Overview of the environmental and social impacts and risks .....	49
Table 18. Roles of key project partners in project execution .....	52
Table 19. Measures for financial and project risk management .....	54
Table 20. Tentative budget for monitoring M&E (included in the Project Execution Cost) .....	57
Table 21. Project’s result framework .....	57
Table 22. Alignment with the Results Framework of the Adaptation Fund .....	63
Table 23. Detailed project budget .....	64
Table 24. Project execution cost by budget lines .....	65
Table 25. Project execution cost by activities .....	65
Table 26. Disbursement schedule .....	66

## List of figures

Figure 1. Location of the project area on the Philippines map (marked with red ellipse). General map and satellite image of the project area – Sibutu and Sitangkai islands.....	7
Figure 2. Pondohan in Sitangkai.....	8
Figure 3. Seaweeds farming areas in Tawi-Tawi.....	9
Figure 4. Existing water sources in Sibutu.....	11
Figure 5. Existing rainwater harvesting systems, Sitangkai .....	11
Figure 6. Schematic diagram of climate adaptation problem addressed by the project. Identified climate change impacts (yellow), vulnerable infrastructure (blue), impact on communities (orange/red).....	16
Figure 7. Proposed project intervention (dark blue) and its impact on local communities (short term impacts – light green, long-term result – dark green) and climate/habitats (lilac).....	20
Figure 8. Simplified process flow diagram for sea water reverse osmosis (SWRO) desalination process .....	22
Figure 9. Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant.....	22
Figure 10. Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant.....	23
Figure 11. Illustrative example of communal rainwater harvesting clusters .....	24
Figure 12. Water – food – energy nexus approach of the project .....	29
Figure 13. Average cost breakdown (Levelized Cost of Water) for large reverse osmosis desalination plants .....	30
Figure 14. Photovoltaic plants and diesel generators deployed by the RETS project in Sibutu and Sitangkai, as of October 2021. ....	37
Figure 15. Proposed project implementation arrangements.....	53

## Abbreviations

BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
MENRE	Ministry of Environment, Natural Resources and Energy
MAFAR	Ministry of Agriculture, Fisheries and Agrarian Reform
LGU	Local Government Unit
PLGU	Provincial Local Government Unit
DENR	Department of Environment and Natural Resources
TOR	Terms of Reference
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GAP	Gender Action Plan
GA	Gender Assessment
UNIDO	United Nations Industrial Development Organization
MinDA	Mindanao Development Authority
RO	Reverse osmosis
MILG	Ministry of Interior and Local Government
FASPS	Foreign-Assisted and Special Projects Services
MSU-TCTO	Mindanao State University - Tawi-Tawi College of Technology and Oceanography
RDS	Raw Dried Seaweeds
SWRO	Seawater Reverse Osmosis

UF	Ultrafiltration
BESS	battery energy storage system
CMD	Cubic meters (m <sup>3</sup> ) per day
PV	Photovoltaic
M&E	Monitoring and evaluation
PMU	Project Management Unit

## Short summary of the project

The project will be implemented in the two island municipalities (Sitangkai and Sibutu) in the province of Tawi-Tawi, Bangsamoro Autonomous Region in Muslim Mindanao, Philippines. It is targeting the water security issue in these two island municipalities. The islands are increasingly affected by climate change through a sea-level rise (saline water intrusion) and more unpredictable rains, impacting water resources available for the communities on the islands.

One of the main income sources for the communities in the project area is seaweeds farming. The seaweed farming communities already face water insecurity, relying mostly on ground water and rainwater harvesting, which will only get worse due to projected climate change impacts (increasing sea level affecting groundwater availability, more unpredictable rainfall). Seaweed farming is also impacted by changing climate – increasing sea temperatures affect frequency of the “ice-ice” disease which reduces yields and value of the seaweed.

The project seeks to increase adaptive capacity of the communities in Sibutu and Sitangkai, through provision of reliable, climate resilient access to water infrastructure and services. Also, it will strengthen livelihoods and sources of income of vulnerable seaweed producing communities in Sibutu and Sitangkai through improvement of seaweed industry, through better, climate-resilient practices. It will build the capacity of the local government units (LGUs) in water management. Finally, the project activities will build awareness of adaptation and climate risk reduction practices within local communities and in Sibutu and Sitangkai, as well as in the wider region.

The project activities will focus on capturing the opportunity of increasing productivity of seaweed farms and quality of raw dried seaweeds, thanks to increased availability of freshwater. Working with local communities the project will focus on developing and improving seaweed production strategies to cope with climate change impacts, including predicted environmental variability and utilizing available water resources. This in turn will strengthen livelihoods and sources of income of vulnerable seaweed producing communities in Tawi-Tawi. It is estimated that total of 71,562 people would benefit directly from the project (with 35,423 women and 36,139 men) and more than 150,000 people indirectly.

## Project Background and Context

### Project area

The Philippines is an archipelago comprised of 7,107 islands (1,000 of which are inhabitable), with a humid climate and a topography characterized by mountainous terrain bordered by narrow coastal plains. Considered one of the most biologically rich and diverse countries in the world, the Philippines also has one of the world’s longest coastlines, and its marine and coastal resources yield US\$3.5 billion annually in goods and services. The Philippines’ main economic sectors are agriculture and industry, with agriculture contributing 14% of gross domestic product and employing over a third of the population. The Philippines is also considered to be among the world’s most disaster-prone countries (floods, droughts, typhoons, landslides and mudslides, earthquakes, and volcanic eruptions). Recent decades have witnessed an increase in damaging extreme events, such as heavy rainfall and tropical cyclone activity and this trend is expected to continue under a changing climate. Sea-level rise is happening at an above-average rate for some parts of the Philippines, exposing up to one million people to flooding from rising sea levels by 2070–2100<sup>1</sup>.

The proposed project areas are **the island municipalities of Sitangkai and Sibutu in the Tawi-Tawi province** (part of the Bangsamoro Autonomous Region in Muslim Mindanao – BARMM) in the Philippines.

These municipalities have been selected based on the following criteria:

- 1) Vulnerability to climate change of the local seaweed farming communities. The low-lying setting of the islands surrounded by water and relatively exposed to predominant wind makes them susceptible to storm surge and sea level rise. Tawi-Tawi faces sea level rise of 8 mm/year, according to the map of rates of sea level changes in the Philippines

<sup>1</sup> Climate Risk Country Profile: Philippines (2021): The World Bank Group and the Asian Development Bank.

between 1993 and 2009<sup>2</sup>. Tawi-Tawi is among the most vulnerable to climate change impacts in the country and has the lowest adaptive capacity, and this is aggravated by having the lowest electricity and water access in the Philippines. Most of the seaweed farming communities in Sitangkai rely on rainwater harvesting, imported ground water from Sibutu and costly bottled water from other islands. Rising sea level and altered rainfall pattern increase the risk of water shortage and increased water cost for the communities.

- 2) Ongoing activities in the region which provide a solid project baseline for adaptation intervention:
  - a. The Renewable Energy Technology to Increase Value Added of Seaweeds in Tawi-Tawi (RETS) project developed two hybrid renewable-diesel mini-grids in Sitangkai and Sibutu to increase access to electricity. The project also conducted feasibility studies of water supply systems in these 2 island municipalities.
  - b. The Integration of Productive Uses of Renewable Energy for Inclusive and Sustainable Energization in Mindanao (I-PURE Mindanao) project is developing distributed renewable energy systems also to increase access in off-grid communities in the region.
  - c. The research program Establishment of the Seaweed Research and Establishment of Seaweed Research and Development Center (SeaRDeC) to support the Seaweed Industry in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) aims to increase the production of high quality raw dried seaweeds that will in turn increase the prices of RDS and thus increase the income of seaweeds farmers.

Tawi-Tawi province is the largest seaweeds producer in the country, and communities are heavily dependent on seaweed farming. Facilitating seaweeds processing in-situ by provision of reliable freshwater access (proposed adaptation project) complementing the on-going activities for provision of electricity (RETS and I-PURE baseline projects) will increase economic sustainability of the local communities therefore increasing their overall resilience to climate change. Sitangkai and Sibutu are the top seaweed producers in Tawi-Tawi province, hence communities at those two localities highly depend on seaweed production for livelihood generation.

The project site selection also considers scalability of the intervention – this intervention may be scaled up to other seaweed farming communities in Tawi-Tawi Province and other provinces of the BARMM region and the Philippines, which face similar issues of poor access to reliable water supply in the context of increasing effects of climate change.

**Therefore, the proposed adaptation project seeks to address water security and related gender issues in these two island municipalities, which would not be addressed otherwise by other initiatives, building on and complementing already ongoing activities in the region.**

---

<sup>2</sup> Siringan F.P., Samson M., Myy S. M., Licuanan W., Rollon R., 2013, Coastal Integrity Vulnerability Assessment Tool, In: Vulnerability Assessment Tools for Coastal Ecosystems: A Guidebook. Marine Environment and Resources Foundation, Inc., Quezon City, Philippines



Figure 1. Location of the project area on the Philippines map (marked with red ellipse). General map and satellite image of the project area – Sibutu and Sitangkai islands.

Source: [https://en.wikipedia.org/wiki/File:Ph\\_physical\\_map.png](https://en.wikipedia.org/wiki/File:Ph_physical_map.png), <https://www.openstreetmap.org>, <https://s2maps.eu/>

### Bangsamoro Autonomous Region of Muslim Mindanao (BARMM)

The BARMM includes the predominantly Muslim provinces of Maguindanao and Lanao del Sur in mainland Mindanao, and the island provinces of Basilan, Sulu, and Tawi-Tawi, and the Islamic city of Marawi City. It is the only region of the Philippines that has its own government. BARMM's population is about 4.4 million based on the 2020 Census. This represents 16.78% of the overall population of Mindanao, or 4.04% of the entire population of the Philippines.<sup>3</sup>

The region first obtained special autonomous status in 1990, with the right to elect its own officials, levy taxes, and set education and development policy. The BARMM was formed with the ratification of its basic law, the Bangsamoro Organic Law following two-part legally binding plebiscite in Western Mindanao held on January 21 and February 6, 2019.<sup>4</sup>

BARMM is one of the poorest regions in the country, due to continuing armed conflict, limited livelihood opportunities, inadequate social services, weak institutions, and deep political, cultural and economic inequity, and generations of systemic injustice and armed violence. The region faces serious development challenges that must be overcome.<sup>5</sup>

The agriculture, fisheries and forestry sectors are the largest contributor to the BARMM regional economy, representing 63.5% of the total regional value added.<sup>6</sup> In turn, BARMM accounts for the largest share of national fisheries and seaweeds production.<sup>7</sup> Some of the local communities in the region are highly dependent on local seaweed production (and fisheries).

Though rich in natural resources but with a poverty incidence rate of 63%, BARMM is one of the poorest regions in the country. It holds one of the highest levels of infant and maternal mortality and one of the lowest life expectancies.

Contributing to this high poverty incidence and aggravating the social conditions of BARMM are the poor access to electricity, water, and sanitation services, three most basic economic and social services. BARMM, based on the latest data from National Electrification Administration (NEA), has an average electricity access of only 34%, the lowest in the country. The BARMM region has also the lowest water supply coverage at only around 48%<sup>8</sup>, with only 7% of the population having

<sup>3</sup> <https://www.philatlas.com/mindanao/barmm.html>

<sup>4</sup> <http://barmm.popcom.gov.ph/socio-demographic-profile/>

<sup>5</sup> BDP, p. 2.

<sup>6</sup> BDP, p. 20.

<sup>7</sup> Mindanao Energy Plan 2018-2040

<sup>8</sup> [https://water.org/documents/101/PWSF\\_MASTER\\_PPT.pdf](https://water.org/documents/101/PWSF_MASTER_PPT.pdf), p. 20.



access to Level 3 water supply, 8% Level 2, and the majority 85% having only level 1 access.<sup>9</sup> BARMM has also the lowest improved sanitation coverage of about 20%.<sup>10</sup> COVID-19 pandemic made the situation only worse - according to recent study, "one of the most challenging aspects of COVID was access to Water, Sanitation and Hygiene (WASH) facilities. This access was already tenuous before the crisis and now lack of access to water has become increasingly deadly".<sup>11</sup>

### Tawi-Tawi Province

Tawi-Tawi is the southernmost frontier of the Philippines, bounded by the Sulu Sea on the north and west and Celebes Sea on the south and east. The archipelagic province consists of a group of 307 small islands and islets blessed with abundant natural resources. Tawi-Tawi has a land area of 3,626.55 sq km and a population of 440,276. Tawi-Tawi has 11 municipalities (including Sibutu and Sitangkai), comprising a total of 203 barangays (smallest administrative division in the Philippines and the native term for a village, district, or ward). Tawi-Tawi's population is growing very fast, and over 40% of the inhabitants are below the age of 14.

The whole province of Tawi-Tawi is among the top 20 provinces in the Philippines most vulnerable to climate change impacts and has been assessed as having the lowest adaptive capacity among the more than 70 provinces in the country.<sup>12</sup>

### Sitangkai

Sitangkai (4° 40' N, 119° 24' E) is a coastal municipality in the island province of Tawi-Tawi with 9 barangays. It has a land area of 735.46 km<sup>2</sup> which constitutes 20.28% of the province's total area. As of 2020, its population reaches 37,319 representing 8.48% of the total population of the province or 0.85% of the overall BARMM population. As of 2020, Sitangkai has 5,331 households and an average of 5.51 members per household. Much of Sitangkai's low-lying lands have been submerged in seawater. Sitangkai is characterized by high population growth rate (2.41% in 2015 – 2020), meaning that a high share of youth population is present on the island.

Panglima Alari is the largest barangay with a population of 8,417. Together with Datu Baguinda Putih, Imam Saple, and Sitangkai Poblacion, these four barangays comprise more than half of the population of Sitangkai and can be seen in the map as clearly submerged in the sea.<sup>13</sup> The residents in these four barangays live in what are called pondohans (see figures below). Sitangkai also include the island barangay of Sipangkot, which is the second largest barangay.



**Figure 2. Pondohan in Sitangkai**

Source: MSU-TCTO

### Sibutu

Sibutu (4° 51' N, 119° 27' E) is a coastal municipality with 16 barangays, with a land area of 56.54 km<sup>2</sup>. Its population as determined by the 2020 Census was 34,243, representing 7.78% of the total population of Tawi-Tawi province or 0.78% of the overall population of BARMM. From the 2020 Census data, Sibutu has 3,910 households with an average of 6.09 members per household. Sitangkai is also characterized by high population growth rate (2.55% in 2015 – 2020), meaning that a high share of youth population is present on the island. People living in Sibutu Island are mostly boat builders. Some also sell seaweeds, firewood and stones.

<sup>9</sup> <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps2033.pdf>, p. 8.

<sup>10</sup> [https://water.org/documents/101/PWSF\\_MASTER\\_PPT.pdf](https://water.org/documents/101/PWSF_MASTER_PPT.pdf), p. 21.

<sup>11</sup> <https://philippines.unfpa.org/en/publications/gender-inclusion-assessment-gia-impacts-covid-19-pandemic-vulnerable-women-and-girls>

<sup>12</sup> Yusuf, Arief Anshory and Herminia Francisco 2010, *Hotspots! Mapping Climate Change Vulnerability in Southeast Asia*. [https://books.google.pl/books?hl=pl&lr=&id=A-sXDFLcMR8C&oi=fnd&pg=PA4&dq=tawi+tawi+adaptation+climate+change&ots=rsw6v5mR-H&sig=F4pO6AbMbNmhfefOo0tkXFEZjY&redir\\_esc=y#v=onepage&q&f=false](https://books.google.pl/books?hl=pl&lr=&id=A-sXDFLcMR8C&oi=fnd&pg=PA4&dq=tawi+tawi+adaptation+climate+change&ots=rsw6v5mR-H&sig=F4pO6AbMbNmhfefOo0tkXFEZjY&redir_esc=y#v=onepage&q&f=false)

<sup>13</sup> See <https://www.openstreetmap.org/?#map=15/4.6618/119.3949>



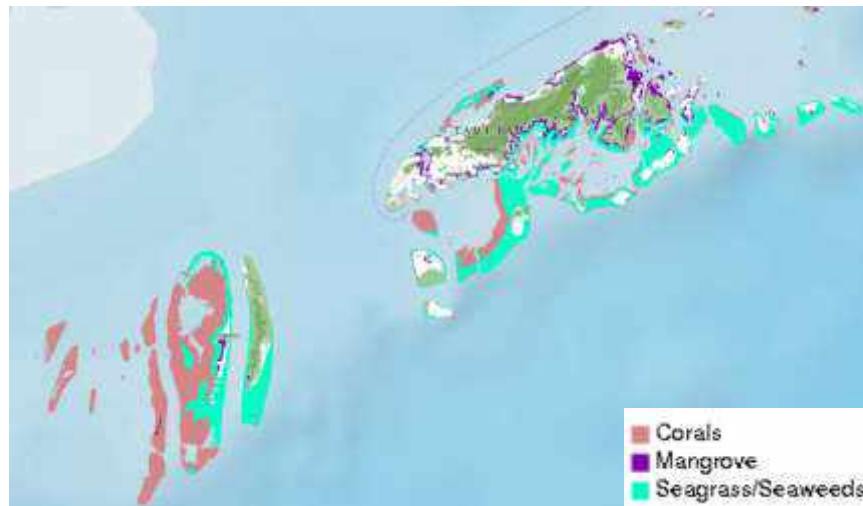
## Target groups

The target group of the project are the seaweed farming communities of Sitangkai and Sibutu, which currently lack a reliable access to water and are facing increased water stress due to climate change, impacting their livelihoods. Sibutu and Sitangkai have been assessed as having medium to high vulnerability to climate change because of their barangays' moderate exposures, moderate to high sensitivities, and low to moderate adaptive capacities to cope with the effects of climate change. However, it may be assumed that Sitangkai is highly vulnerable to climate change because the whole municipality is low-lying with no mountains.<sup>14</sup> Also, poor access to electricity and fresh water limits the coping capacity of the communities to the effects of climate change thus lowering overall resilience of the communities.

### Seaweed farming

Seaweed farming, among other sea-related production, in targeted communities is one of the main sources of income to the communities. In the project area shallow reefs exceed the area of dry land and the population is surrounded by abundant tropical reef habitats ideal for seaweed aquaculture and other types of sea production.<sup>15</sup>

Ten of the eleven municipalities of Tawi-Tawi produce seaweed, making the province the leading supplier of seaweeds throughout the country with 70% of total production. The province is highly suitable for seaweed farming because it is the least frequented by typhoons resulting to favorable conditions for seaweed cultivation.



**Figure 3. Seaweeds farming areas in Tawi-Tawi**

Source: <https://www.geoportal.gov.ph/>

Despite the extensive farmed seaweed area, production has not increased through the years. This is due to “a host of challenges such as the lack of high-quality seedstocks, “ice-ice” disease infection, epiphyte infestation, and poor farming and post-harvest practices.<sup>16</sup> Specifically the “ice-ice” disease is important in this context, because it lowers farm yields up to 70% and reduces the quantity and quality of carrageenan produced by 25 – 40%, lowering the market value of the produced seaweed. More frequent occurrence of the “ice-ice” disease is attributed to the increasing water temperature and sea pollution (among other factors)<sup>17</sup>. Increasing sea temperature, as a result of climate change is another potential threat to seaweed farmers in the project area<sup>18</sup>.

While seaweed farming in Tawi-Tawi is a major source of livelihood of the community, there seems to be few innovations and introduced adaptive measures to improve seaweed cultivation and postharvest practices.<sup>19</sup> Therefore work on strain selection and improvement in the seaweed culture system has been undertaken to produce fast growing, disease resistant, resilient to environmental variations and high carrageenan yield and quality seed stocks for each farming season.<sup>20</sup>

Sitangkai and Sibutu are the top seaweed producing municipalities of the province. Seaweed farming is a family enterprise in

<sup>14</sup> Burias et. al. (2021).

<sup>15</sup> RETS VCA study, p. 10.

<sup>16</sup> Bugtong et. Al. (2021), p.3.

<sup>17</sup> Ward, GM, Kambey, CSB, Faisan, JP, et al. Ice-Ice disease: An environmentally and microbiologically driven syndrome in tropical seaweed aquaculture. Rev Aquac. 2021; 14: 414– 439. <https://doi.org/10.1111/raq.12606>

<sup>18</sup> See also <https://www.nytimes.com/interactive/2023/03/15/climate/seaweed-plastic-climate-change.html>

<sup>19</sup> Bugtong et. Al. (2021), p.4.

<sup>20</sup> Cited in Bugtong et. al. (2021), p.4

the project are – all members of the family are engaged (men mostly work on the sea, while women and children are engaged in the preparatory and post-harvesting tasks). Many seaweed farming families in the two municipalities use to an equal degree either their personal funds or credit from traders to finance their farm implements. Because of this arrangement, traders monopolize the market and dictate seaweed prices.<sup>21</sup> Based on an interview with an official from the Tawi-Tawi Provincial office of MAFAR, seaweed farmers are price-takers. The only way they could get a good price is when they could sell a good quantity of raw, dried seaweed (RDS). Thus, capital assistance is very much needed to enhance the farmer's capacity to increase production and improve the quality of RDS.<sup>22</sup> Majority of seaweed farmers also need funds to buy seed-stocks or cultivars for the next cropping cycle from fellow farmers or traders.

Tawi-Tawi is the largest producer of seaweeds in BARMM but ranks only sixth in terms of value. This reflects the lack of processing capabilities in which energy and water are vital inputs.<sup>23</sup> Lack of quality seedlings and better post-harvest facilities impacts the price of raw dried seaweeds. Limited water supply infrastructure impacts the ability to process and refine seaweeds into higher value quality products as carrageenan. Increasing income opportunities and improving economic stability of the seaweed farming communities will increase their resilience to climate change.

## Water access issues

With the whole BARMM region having the lowest water supply coverage in the country and majority of the population having only level 1 access, as mentioned above, Tawi-Tawi is also deemed as among the provinces with poor water access.

Based on recent and prior study<sup>24</sup> both islands experience serious water scarcity, as all (Sitangkai) or part of (Sibutu) water sources are brackish. The average current water consumption per day is 235 m<sup>3</sup> in Sitangkai and 153 m<sup>3</sup> in Sibutu, of this ca. 65% used for drinking and cooking. The average daily per capita consumption is respectively 6.05 liters and 4.31 liters. This is much lower (less than 7%) of the standard requirements for households as defined by a World Bank, leading to dehydration, malnutrition and poor health conditions.

The population relies heavily on rainwater collection (particularly in the pondohans) and water sources from shallow/dug/bore wells located around the island, even when these are already brackish, as well as the existence of water retailers for purified drinking water, and the import of pure bottled drinking water from elsewhere (outside the island at the cost of up to ~5USD per m<sup>3</sup>). In the most recent survey-visit (December 2022) in Sitangkai Island, there are many reported historical instances when identified shallow wells were abandoned as water supply became brackish; this prompted the local folks to find other wells with fresh water supply farther from the coastline<sup>25</sup>.

Each of these barangays are served by single water supply systems that are owned by either the barangay Local Government Unit (LGU), homeowners' association, or a private entity. The four barangays surveyed in Sitangkai are served by barangay LGU owned water supply systems. 10 of the 12 barangays surveyed report a level 2 water supply system, while two a level 1 or level 3 water supply. Two barangay water supply systems surveyed in Sibutu and one in Sitangkai are not operational. In any case, the water supply systems consist of communal wells, a shallow well pump, concrete water tank, groundwater boreholes, but without any water treatment facility or communal faucets and pipes, and evidently sub-standard and dilapidated. All report inadequate funds for operation and maintenance as well as needed improvements, particularly those that are currently non-operational.

Based on the official definitions of water supply service levels shown below, the barangay water supply systems in Sitangkai and Sibutu would fall under level 1 and not level 2. Also, by definition, barangay operated water supply systems fall under level 1.<sup>26</sup> NEDA Board Resolution No. 12, Series 1995, defines the levels for water supply service in the country as:

- Level 1 (point source) – a protected well or a developed spring with an outlet but without a distribution system as it is generally adaptable for rural areas where the houses are thinly scattered serving an average of 15 households with people having to fetch water from up to 250 meters distance
- Level 2 (communal faucet system or stand post) – a piped system with communal faucets usually serving 4-6 households within 25 meters distance<sup>27</sup>

---

<sup>21</sup> Bugtong et. al. (2021).

<sup>22</sup> Bugtong et. al. (2021), p. 12, 13.

<sup>23</sup> RETS project concept note.

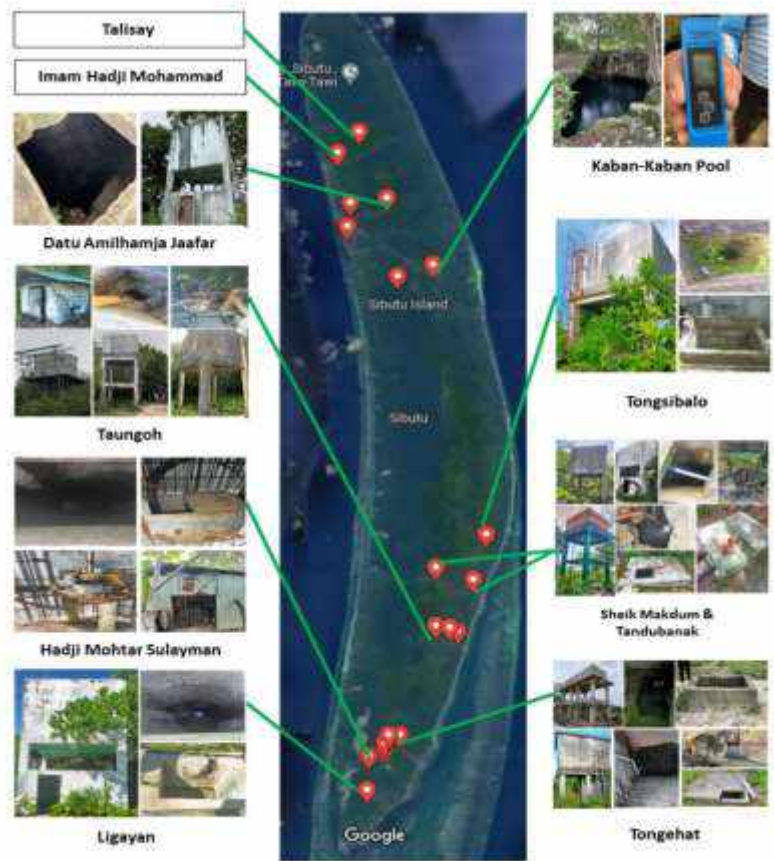
<sup>24</sup> Taboada E.B. et. al. (2022), "Assessment and Preliminary Design Options for Feasible Renewable Energy-Water Supply Systems in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines," EU-ASEP-UNIDO-RETS Project.

<sup>25</sup> Key informant interviews (KIIs), Sitangkai Island, December 2022.

<sup>26</sup> "BWSAs (Barangay Water Supply Associations) operate Level I facilities (mostly wells with handpumps) while Level II piped supplies are operated by RWSAs (Regional Water Supply Associations) and cooperatives." (PWSSR, p. xv.)

<sup>27</sup> Official definition of Level 2 water supply facility/service (communal faucet system or standposts): A water supply facility composed of a source, a reservoir, a piped distribution network with adequate treatment facility, and communal faucets. Usually, one faucet serves 4- 6 households. Generally suitable for rural and urban fringe areas where houses are clustered densely to justify a simple piped system. The definition was modified with the inclusion of the underlined phrase 'with adequate

- Level 3 (waterworks system) – a fully reticulated system with individual house connections based on daily water demand of more than 100 liters per person.



**Figure 4. Existing water sources in Sibutu**

Source: *Taboada E.B. et. al., op.cit.*



**Figure 5. Existing rainwater harvesting systems, Sitangkai**

Source: *ESIA Study*

Based on field studies and interviews with inhabitants (both women and men), current water access at the islands is as follows:

- Existing water sources from shallow, dug, and bore wells are mostly unprotected, in dire state (broken, not functional, not operational), and lack proper maintenance. In its vicinities, impurities and leaked/excess fuel from generators are often detected. The water sources are vulnerable to contamination, salt intrusion (especially those located in coastal

treatment' to emphasize that source of water supply has passed the Philippine National Standards for Drinking Water. (Source: <https://psa.gov.ph/content/level-ii-water-supply-facilityservice-communal-faucet-system-or-standposts-1>)

areas), and other unavoidable circumstances and incidents like thief, vandalism, and disputes.

- Water pumps are powered by diesel- or gasoline-fired generators, which operate on a part-time basis (4-8 hours daily and 2-3 times weekly) and are heavily dependent on continued budgetary support from the local government units (e.g., barangays), which oftentimes run out, causing water supply shortage for indefinite periods of time.
- Most barangays or villages have their own independent sources of water, which is good, but most of them are in dire state as described above.
- The water supply from these sources is untreated (unfiltered and not disinfected), which causes doubt for its cleanliness, safety, and potability. Water analysis was previously conducted but this happened very rarely.
- Bulk water importation is extremely expensive, especially those bottled, processed, and purified (via filtration and reverse osmosis done by water purifying and refilling stations).
- Rainwater is untreated, its catchment is very basic and rudimentary, and is mostly constrained by vulnerability to prolonged drought, shortage of roofing space, exposure to dirt and contaminants from animals, rodents, birds, and others.
- Water storage tanks are also basic, often rudimentary, and not well-maintained.
- Water recycling is not a regular practice and wherever it is done, it is limited in scope and process, which are usually carried out by households. However, seawater or brackish water (from nearby wells) is often used for cleaning and other domestic purposes.
- The construction of community- or island-wide ground water supply system is capital intensive and would potentially pose several unintentional environmental problems which need appropriate mitigation (such as those related to site selection, sources and use of materials, generation of excessive noise, pollutants, and others).
- The islands have no water management system which can take care of the water problem and the sustainability of the water resources in the long-term.
- Majority of the island communities, especially those living in coastal areas with houses built on stilts, commonly practice open defecation and or direct disposal of wastes into the sea. Common toilets in these communities are of hanging latrine type, with no catchment and pipelines and connected to septic tanks.
- There is no community- or island-wide sewage and septage collection, treatment, and disposal system.

Sitangkai, and Sibutu are each served by National Power Corporation – Small Power Utilities Group (NPC-SPUG). Tawi-Tawi remains among the poorest, least electrified provinces in the country. Household electrification rate for the whole province is just above 20%, and even those connected to the SPUG's diesel mini-grids receive only between 12 and 16 hours of electricity service daily. Lack of electricity also impacts water availability (need for additional power sources for the water system). The problem of low electrification in the project area is targeted by the RETS and I-PURE projects.

## Gender issues<sup>28</sup>

Without safely managed water, sanitation and hygiene (WASH) services, women and girls are more vulnerable to abuse, attack and ill-health, affecting their ability to study, work and live in dignity. Women and girls usually have the responsibility of fetching water. This can be a dangerous, time-consuming and physically demanding task. Long journeys by foot, often more than once a day, can leave women and girls vulnerable to attack and often precludes them from school or earning an income. For women and girls, sanitation is about personal safety. Having to go to the toilet outside or sharing facilities with men and boys puts women and girls at increased risk of abuse and assault. Women and girls have specific hygiene needs. A clean, functional, lockable, gender-segregated space is needed, with access to sanitary products and disposal systems, for women and girls to manage menstrual hygiene and pregnancy. Lack of safely managed water and sanitation is an equality issue. Women and girls are disproportionately affected by poor water, sanitation and hygiene services and facilities. However, their voices and needs are often absent in the design and implementation of improvements, thereby ensuring their continued marginalization.

In Sibutu and Sitangkai women and girls are responsible for household chores. Water collection is one of them. Therefore, they spend time every day fetching water from far-off wells and collection points. This unpaid labour prevents them from participating in and contributing to the formal economy, investing in their education and health.

Traditionally water management—the science and engineering of the resource—and water policymaking have been male-dominated spaces, much like other fields of governance. The role of women within water decision-making spheres, both at the domestic level and even more so at the international, transboundary space, has been unrecognized and overlooked.

---

<sup>28</sup> Based on Bugtong et. al. (2021), pp.7-8, RETS project experience, consultations and interviews with seaweed farming families



Domestic water management, which is more focused on supply management through infrastructure development, is a very top-down political process and is managed through patriarchal structures highly dominated by men on the political as well as technical sides. A World Bank study of 28 economies<sup>29</sup> showed that fewer than one in five workers in the water utility sector were women. This imbalance often results in water management, distribution, and access processes which are oft-times fundamentally ignorant to the needs of women and young girls. The project will analyze during project inception the involvement of women in water management in Sibutu and Sitangkai and ensure that the established water system will be gender-responsive.

Seaweed farming is a family enterprise with family members, both immediate and extended, helping out during the pre-farming preparation, farming, harvesting, and drying. Children, including those of their neighbors, help, which makes them miss school. Women are involved in all stages of the cropping cycle and post-harvest processing—from prepping and tying the seedlings to the lines in the farm, setting up the lines, to maintaining the growing seaweeds, harvesting, drying, and packing. In addition, women also sell fresh seaweeds in the markets. However, women farmers are not compensated for their contribution to the farm because their labor inputs are not considered as part of the capital investment. In addition, women farmers are not considered the main players of the industry because of their limited knowledge, lack of skills, training and lower level of education compared to their male counterparts. They learned to farm through their own initiative and hands-on activities. The male farmers attribute their success in farming to the skills and experience gained from farming for a long time. Skilled and experienced farmers were more likely able to address problems such as ice-ice infection, epiphyte infestation or extreme weather conditions. It is important to note that a good education would improve the capacity of seaweed farmers to think critically and manage their farms effectively.

## Climate hazards and future climate trends

### Climate related hazards

The Philippines faces some of the highest disaster risk levels in the world, ranking joint 34<sup>th</sup> out of 191 countries in the INFORM 2023 Risk Index<sup>30</sup>. The country is especially exposed to tropical cyclones, ranking 2<sup>nd</sup> highest in terms of risk. Flooding is also a considerable risk (ranked 31<sup>st</sup>) and a major contributor to the Philippines' position on the INFORM index. Tightly linked to these risks is the threat of landslides, which is significant, particularly in the country's northern regions. The risks associated with drought, however, are less pronounced (ranked 68<sup>th</sup>). In terms of 'coping capacity', the Philippines ranks joint 105<sup>th</sup>. The following climate-related natural hazards have been analyzed in the context of the project site (based on the World Bank Climate Change Knowledge Portal<sup>31</sup> and National Drought Plan for the Philippines<sup>32</sup>):

- (a) **Temperature and heatwaves** – the Philippines experienced a rise of 0.62°C in annual average mean temperature between 1958-2014 and a significant increase in the number of hot days and warm nights throughout the country between 1960-2003 (trends are similar to those experienced across the Pacific region in general), with significantly higher increase in the mean temperatures in southern part of the country. Over the same period there is also an increasing significant trend in the number of hot days (maximum temperature above 99<sup>th</sup> percentile) and a decreasing significant trend in the number of cold nights relative to normal values for 1971-2000.
- (b) **Sea surface temperatures** from 1982 to 2017, based on NOAA's data, have been increasing since 1982 at an average rate of 0.20°C per decade or an average absolute increase of 0.65°C up to 2017<sup>33</sup>.
- (c) **Precipitation and droughts** - analysis of rainfall records in the period of 1951 to 1992 shows negative rainfall amount trends in Mindanao, Visayas, and Eastern Luzon. There is also a decreasing trend in rainfall associated with the southwest monsoon (SWM) in the past 50 years and an increasing trend in the number of “no rain” days suggesting a longer dry period during the SWM in recent decades over western Philippines. The occurrence of drought is heavily influenced by the El Nino Southern Oscillation (ENSO) and its warm and dry phase, El Nino, the southern parts of the country (Mindanao) are particularly affected. There have been 11 droughts recorded since 1968 (on average every 4-5 years). The 2015-2016 drought, which caused damage across 16 of the Philippines 18 regions (85% of the country), was driven by the most severe El Nino event ever recorded.
- (d) **Sea level rise** – according to the University of the Philippines-Marine Science Institute, sea level rise in the Philippines is three to four times faster than the global average rate and impacts of sea-level rise such as coastal flooding, coastal erosion and the salinization of aquifers are already felt, there are numerous compounding local factors. The rate of sea-level rise experienced in Manila Bay and Visayas in recent decades is at 15mm per year (between 1960 and 2012).

<sup>29</sup> <https://openknowledge.worldbank.org/bitstream/handle/10986/32319/140993sum.pdf?sequence=5&isAllowed=y>

<sup>30</sup> <https://drmkc.irc.ec.europa.eu/inform-index/INFORM-Risk>

<sup>31</sup> Based on the Coupled Model Inter-comparison Project Phase 5 (CMIP5) models, utilized within the Fifth Assessment Report (AR5)

<sup>32</sup> [https://knowledge.unccd.int/sites/default/files/country\\_profile\\_documents/1%2520FINAL\\_NDP\\_Philippines.pdf](https://knowledge.unccd.int/sites/default/files/country_profile_documents/1%2520FINAL_NDP_Philippines.pdf)

<sup>33</sup> Geronimo, RC (2018). Projected Climate Change Impacts on Philippine Marine Fish Distributions. Department of Agriculture – Bureau of Fisheries and Aquatic Resources.

- (e) **Cyclones and floods** - the Philippines is highly exposed to flooding, the consequence of severe cyclones and heavy rainfall. The Philippines is one of the most cyclone-prone countries in the world, lying on what is often described as the 'typhoon belt'. Approximately 19–20 cyclones enter the Philippine Area of Responsibility annually, with 7–9 reaching landfall. The number of typhoons making landfall around the Leyte Island region of the country has steadily increased over the last 70 years.

### Future trends

According to the latest Philippine Atmospheric, Geophysical and Astronomical Services Administration Climate Change projections and World Bank Group's Climate Change Knowledge Portal (CCKP), the Philippines will experience:

- (a) **Temperature and heatwaves** - the Philippines will experience a trend of consistent warming, with more significant warming occurring towards the end of the century (from 0.8°C to 3.1°C depending on the representative pathway). Under all emissions pathways projections, the probability of experiencing a heat wave increases dramatically by 2080–2099, for Mindanao in the south, particularly large increases in heatwave probability are projected, with potential for year-long heatwaves by 2050.
- (b) **Sea surface temperature** – global projections show different trajectories temperature trends within the Philippines' seas up to 2100 depending on how strongly global greenhouse gas emissions are mitigated ranging from 0.7°C to 3.1°C increase in mean sea surface temperature. More detailed regional models provide estimates that the Philippines' seas are projected to warm by more than 3.5°C by 2100<sup>34</sup>.
- (c) **Precipitation and droughts** - considerable uncertainty surrounds projections of local long-term future precipitation trends, but some trends are evident, that is increasing trends in annual rainfall and seasonal rainfall in many parts of the country associated with extreme rainfall events. The intensity of sub-daily extreme rainfall events appears to be increasing with temperature.
- (d) **Sea level rise** – the sea-level is projected to increase by 50 cm by mid-century and by up to 1.33 m by 2100 under the highest emissions scenario (SSP5-8.5). Furthermore, 16.9% of the Philippines' islands are projected to become submerged under extreme scenarios of sea-level rise (6m).
- (e) **Cyclones and Floods** minimal increase in the frequency of very strong tropical cyclones exceeding 170 km/h; and Typhoons also appear to have greater intensity - there is a likelihood that high intensity events will become more frequent, and available models suggest that expected annual damages could increase by up to 35% by 2050.

### Climate change impacts and natural resources

The Philippines ranked 4<sup>th</sup> among the countries most affected by extreme weather events in 2000-2019 (Long-term Global Climate Risk Index)<sup>35</sup>, in this period the country experienced a total of 317 weather-related events, the highest among the most affected countries.

According to the WorldBank<sup>36</sup>, the Philippines, is becoming increasingly vulnerable to **water scarcity**, a consequence of rising population and increased demands from household and industrial consumption. Climate change could impact hydrological processes, having significant effects on numerous aspects of water resources, including streamflow, domestic water supply, irrigation, aquifer depth and recharge as well as water quality such as saline intrusion. Changed rainfall patterns may lead to water shortages due to the inability to store excess water for use in the dry season. In addition, intense rainfall events may not recharge groundwater at the rate experienced when rainfall is spread more evenly across the season. Finally, lower than average rainfall during the dry season may also affect soil porosity and vegetation condition leading to reduced infiltration rates and groundwater recharge (Miller, Alexander, & Jovanovic, 2009).<sup>37</sup>

Observed **sea level rise** is significantly higher than the global average and puts at risk 60% of LGUs covering 64 coastal provinces, 822 coastal municipalities, 25 major coastal cities, and an estimated 13.6 million Filipinos that would need relocation.<sup>38</sup> Impacts of sea-level rise such as coastal flooding, coastal erosion and the salinization of aquifers are already felt in the country. Additionally ground compaction due to excessive groundwater withdrawal adds to the problem.

**Sea surface temperature** increase results in lower oxygen levels and ocean acidification. In the Philippines, a decline of around 9% of fisheries GDP and coral bleaching was observed owing to rising ocean temperatures. Seaweed survival, growth, and reproduction are known to vary with numerous climatically sensitive environmental variables including

<sup>34</sup> Geronimo, RC (2018), *ibid*.

<sup>35</sup> <https://www.preventionweb.net/news/highlights-ipcc-ar6-wg1-and-its-relevance-philippines>

<sup>36</sup> Climate Risk Country Profile: Philippines (2021): The World Bank Group and the Asian Development Bank

<sup>37</sup> Cruz, R. V. O., et. al. (2017). 2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission, p.2 and 8. <https://climate.gov.ph/files/PhilCCA-WG2.pdf>

<sup>38</sup> PDP, p. 3-17. CCC 2018. *Climate Change and the Philippines: Executive Brief*.

temperature, salinity, wave heights, pH, and carbon dioxide concentration, which are influenced by climate change. Rising sea temperature has a negative effect on seaweed productivity through reduced spore production, reduced germination, and growth<sup>39</sup>. It also increases the occurrence of “ice-ice” disease impacting seaweed productivity and value<sup>40</sup>.

Women often face higher risks and greater burdens from the impacts of climate change in situations of poverty and due to existing roles, responsibilities and cultural norms. For example, in Sibutu and Sitangkai, women are responsible for household energy, food, water and care for the young and elderly. Climate change amplifies existing gender inequalities and poses unique threats to women’s and girls’ livelihoods, health, and safety since during droughts women have to travel further to collect water, they have to work harder to secure income and resources for their families. This puts added pressure on children, often girls, who often have to leave school to help their mothers manage the increased burden.

### **Specific impacts in the project area**

Tawi-Tawi is a province composed of small and low-lying island communities where many of its residents live along the coast because of its easy accessibility to the sea. These coastal communities are highly dependent on the ocean for food and livelihood. The islands are surrounded by diverse coastal ecosystems like seagrass beds, mangrove forest and coral reefs. However, the low-lying setting of the islands surrounded by water and relatively exposed to predominant wind makes them susceptible to storm surge and sea level rise. In addition, Tawi-Tawi is located in a region where the rate of sea level rise is 8mm/year based on the map of rates of sea level changes in the Philippines between 1993 and 2009.<sup>41</sup>

Particularly in the project area, **climate change will increasingly reduce the already scarce water resources in these areas**. The climate change threats to water resources include increased intensity and frequency of storm (La Nina) and drought (El Nino); variation in stream flow and groundwater recharge, affecting water quality and seasonal water availability; higher temperature affecting water quality (such as eutrophication); and sea level rise causing saltwater intrusion into surface and ground water, affecting the amount and quality of water supplies<sup>42</sup>, and increased vulnerability of homes to inundation.

Based on the climate vulnerability assessment of the capital town of Bongao Island (Tawi-Tawi) to sea level rise, storm surge and wave impacts, the islands of Tawi-Tawi have high sensitivity to these climate impacts depending on population, seagrass (seaweeds) and coral cover, and presence of mangrove forests.<sup>43</sup>

Unpredictable rains and longer dry seasons have been observed also in Tawi-Tawi during the last 3 to 4 years. This could also impact ground water supply and quality especially as these climate phenomena are expected to persist. Rainwater harvesting, which is a main practice to have water supply is obviously also affected. Also, continuous underground water extraction in Sibutu could lead to salt-water intrusion and collapse of infrastructures.

### **Vulnerability of the project area**

Tawi-Tawi is among the most vulnerable to climate change impacts in the country and has the lowest adaptive capacity, and this is aggravated by having the lowest electricity and water access in the Philippines (with the whole BARMM having the lowest water supply and sanitation coverage).

Communities in Sibutu and Sitangkai have been assessed as having medium to high vulnerability to climate change because of their barangays’ moderate exposures, moderate to high sensitivities, and low to moderate adaptive capacities. However, it may be assumed that Sitangkai is highly vulnerable to climate change because the whole municipality is low-lying with no mountains.<sup>44</sup>

Poor water access is a result of existing but substandard and poorly operated and maintained Level II (communal) water supply systems in most Sibutu and Sitangkai barangays, some of which are not operational. Many households in these 2 island municipalities also rely on rainwater harvesting. In Sitangkai, potable water is imported from Sibutu.

Increasing sea water temperature negatively impacts seaweed productivity, decreasing yields and ultimately reducing communities’ income.

---

<sup>39</sup> Harley, Christopher & Anderson, Kathryn & Demes, Kyle & Jorve, Jennifer & Kordas, Rebecca & Coyle, Theraesa & Graham, Michael. (2012). Effects Of Climate Change On Global Seaweed Communities. *Journal of Phycology*. 48. 1064-1078. 10.1111/j.1529-8817.2012.01224.x.

<sup>40</sup> Ward, GM, Kambey, CSB, Faisan, JP, et al., op. cit.

<sup>41</sup> Burias, Dahlia P. et. al. (2021), “Climate change vulnerability assessment of islands in Tawi-Tawi, Southwestern Philippines” (unpublished).

<sup>42</sup> [https://www.wetlands.ph/wp-content/uploads/2019/03/NWRB\\_WRM-in-the-Phil-Status-Challenges-and-Opportunities.pdf](https://www.wetlands.ph/wp-content/uploads/2019/03/NWRB_WRM-in-the-Phil-Status-Challenges-and-Opportunities.pdf). A Study conducted by the WRI predicts the Philippines will experience a “high” degree of water shortage by 2040 (CCC 2018. *Climate Change and the Philippines: Executive Brief*).

<sup>43</sup> [https://www.researchgate.net/publication/267293548\\_Vulnerability\\_assessment\\_of\\_an\\_island\\_in\\_Southern\\_Philippines\\_to\\_climate\\_change](https://www.researchgate.net/publication/267293548_Vulnerability_assessment_of_an_island_in_Southern_Philippines_to_climate_change)

<sup>44</sup> Burias et. al. (2021).



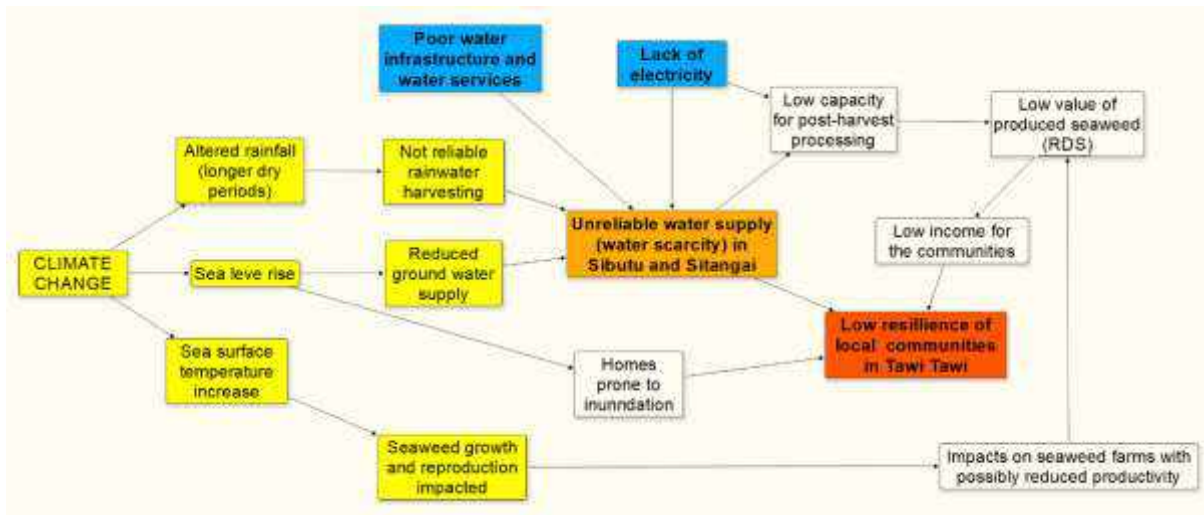
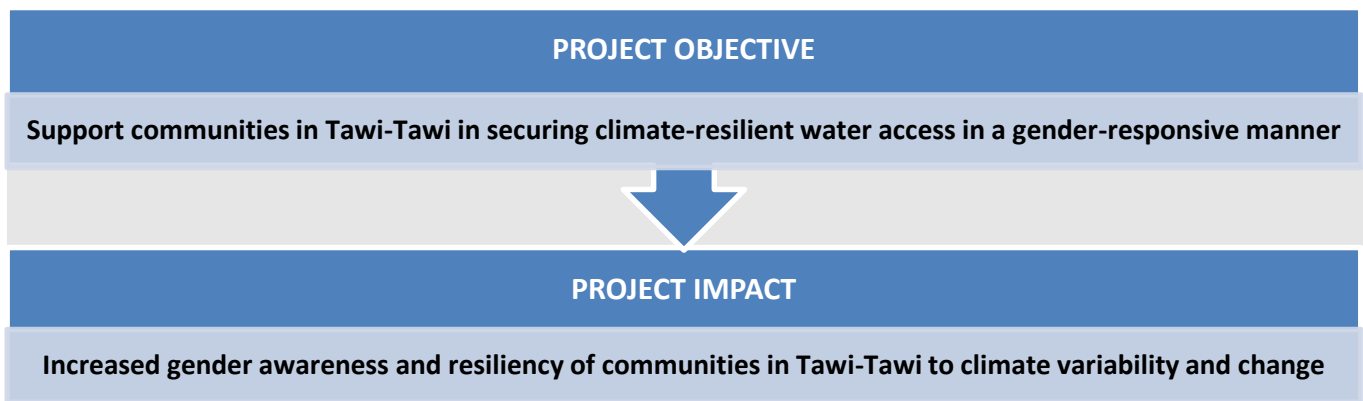


Figure 6. Schematic diagram of climate adaptation problem addressed by the project. Identified climate change impacts (yellow), vulnerable infrastructure (blue), impact on communities (orange/red).

Source: own elaboration

## Project Objectives

The proposed project aims to support communities in Tawi-Tawi in securing climate-resilient water access.



### Specific project objectives

1. Increased adaptive capacity through access to resilient water infrastructure and services for differentiated gender groups and sub-groups
2. Strengthened livelihoods and sources of income of vulnerable seaweeds producing communities in Tawi-Tawi taking into account traditional local knowledge of women and men.
3. Strengthened awareness and ownership of adaptation and climate risk reduction processes within local communities in Tawi-Tawi.

## Project Components and Financing

The seaweed farming communities already face water insecurity, which will only get worse due to climate change. **The project will seek to increase adaptive capacity of the communities in Sibutu and Sitangkai, through provision of access to water infrastructure and services in a gender-responsive way.** Also, it will strengthen livelihoods and sources of income of vulnerable seaweed producing communities in Sibutu and Sitangkai through improvement of seaweed industry. It will build the capacity of the local government units (LGUs) in water management. Finally, the project activities will build awareness of adaptation and climate risk reduction strategies within local communities and in Sibutu and Sitangkai, as well as in the wider region.

Table 1. Project components and financing

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
--------------------	---------------------------	-------------------	---------------

1. Deployment of a resilient water supply systems integrated with existing RE infrastructure in Tawi-Tawi	1.1. Water and sanitation infrastructure designed to enhance gender equality and women's empowerment	1. Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities	5,650,000
	1.2. Desalination plant commissioned in Tongmageng and water distribution system set up in Sitangkai applying a gender-responsive approach		
	1.3. Water distribution system in Sibutu is retrofitted and upgraded to level 3 according to accepted national technical standards improving women's livelihoods		
	1.4. Pilot, gender-responsive, collective rainwater harvesting and sanitation systems installed in Sibutu and Sitangkai		
2. Capacity building and awareness raising at the local level in Tawi-Tawi	2.1. Water service management system in Sibutu and Sitangkai operationalized	2. Local management structures strengthened, LGUs trained and relevant plans prepared	110,000
	2.2. Local development planning strengthened on gender-transformative climate change adaptation approaches		
3. Upgrading of seaweeds industry in Tawi-Tawi	3.1. Differentiated gender groups and sub-groups in Seaweed farming communities supported with relevant skills and solutions to address climate change	3. Seaweed production strategies strengthened in relation to climate change impacts, including variability	200,000
	3.2. Seaweed producing women groups on each island established or strengthened with direct capacity building support.		
4. Awareness raising and knowledge sharing	4.1. Differentiated gender groups and sub-groups in Local communities trained in climate change adaptation solutions	4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared	270,000
	4.2. Knowledge disseminated to other regions with seaweed producing women's groups		
5. Project scaling up	5.1. Documentation and plans for project scale up in the Philippines prepared	5. Scaling up of project outcomes facilitated	60,000
6. Project Execution cost			559,950
7. Total Project Cost			6,849,950
8. Project Cycle Management Fee charged by the Implementing Entity (if applicable)			582,246
<b>Amount of Financing Requested</b>			<b>7,432,196</b>

## Projected Calendar

Table 2. Projected calendar

Milestones	Expected Dates
Start of Project Implementation	January 2024

Mid-term Review (if planned)	October 2025
Project Closing	December 2027
Terminal Evaluation	October 2027

## PART II: PROJECT / PROGRAMME JUSTIFICATION

### A. Description of the project components

*Describe the project components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.*

The proposed project includes the development and rehabilitation of the water supply and distribution system facility in Sibutu, the development of desalination facility powered by solar energy in Sitangkai, and the improvement of rainwater catchment and sanitation systems in both islands in a gender-responsive way. The project is committed to supplement existing water shortages by undertaking water treatment and distribution infrastructure development and enhancement, empower women and improve public health by providing clean, safe, and potable water, and offering appropriate pilot sanitation and hygiene systems in groups of households and communities, particularly those living on stilt houses in coastal areas, in both islands.

The project manifests the complex water issues in both islands and employs a combination of approaches to improve water supply and distribution, reduce water leakages and wastage, and enhance rainwater harvesting systems as an important alternative to tapping and supplementing freshwater resources. Coupled to these actions are institutional strengthening, gender awareness raising and behavioral change programs through awareness and educational activities to ensure sustained efforts.

**Installation of 1000 CMD desalination plant, developing and upgrading of water distribution system are the main infrastructure solution addressing climate change impacts being proposed by the project for the island municipalities of Sitangkai and Sibutu, which has no reliable water sources.** The desalination plant will be powered by a 1MWp PV installation (which will be an extension of the already installed RE mini-grid by the RETS project) and supplemented by a water distribution system. The goal is to build a resilient water supply, currently at stake due to rising sea level (intrusion of seawater into ground water) and unpredictable and variable rainfall - all resulting from changing climate patterns. These climate impacts affect the amount and quality of available water supply in the two islands and increase the cost of water to the communities. In parallel, the project will upgrade existing substandard (not conforming with national standards) communal wells at Sibutu and upgrade them to level 3 water supply systems. Additionally, the project will demonstrate improved communal rainwater harvesting systems on both islands, which will complement the water supply system to meet the basic needs of women and seaweeds farming communities in Sitangkai and Sibutu.

Investment component of the project will be accompanied by establishment of a proper water service management system in and capacity building activities for LGUs to ensure project sustainability and gender mainstreaming. Local Climate Change Action Plans will be prepared.

Additionally, the project activities will focus on capturing opportunity of increasing productivity of seaweed farms and quality of RDS. Working with local communities the project will focus on developing and improving seaweed production strategies in relation to climate change impacts, including predicted environmental variability and utilizing available water resources and electricity, with particular focus on women. This in turn will strengthen livelihoods and sources of income of vulnerable seaweed producing communities in Tawi-Tawi.

Awareness raising activities will be delivered to local communities to strengthen awareness and ownership of adaptation and climate risk reduction processes in Tawi-Tawi. Knowledge and lessons learnt will be documented in order facilitate knowledge sharing and scaling up of the activities to other parts of Tawi-Tawi/Philippines. The project will also address gender issues and youth engagement with targeted activities. Based on project experience, a scale-up project concept for the GCF will be prepared.

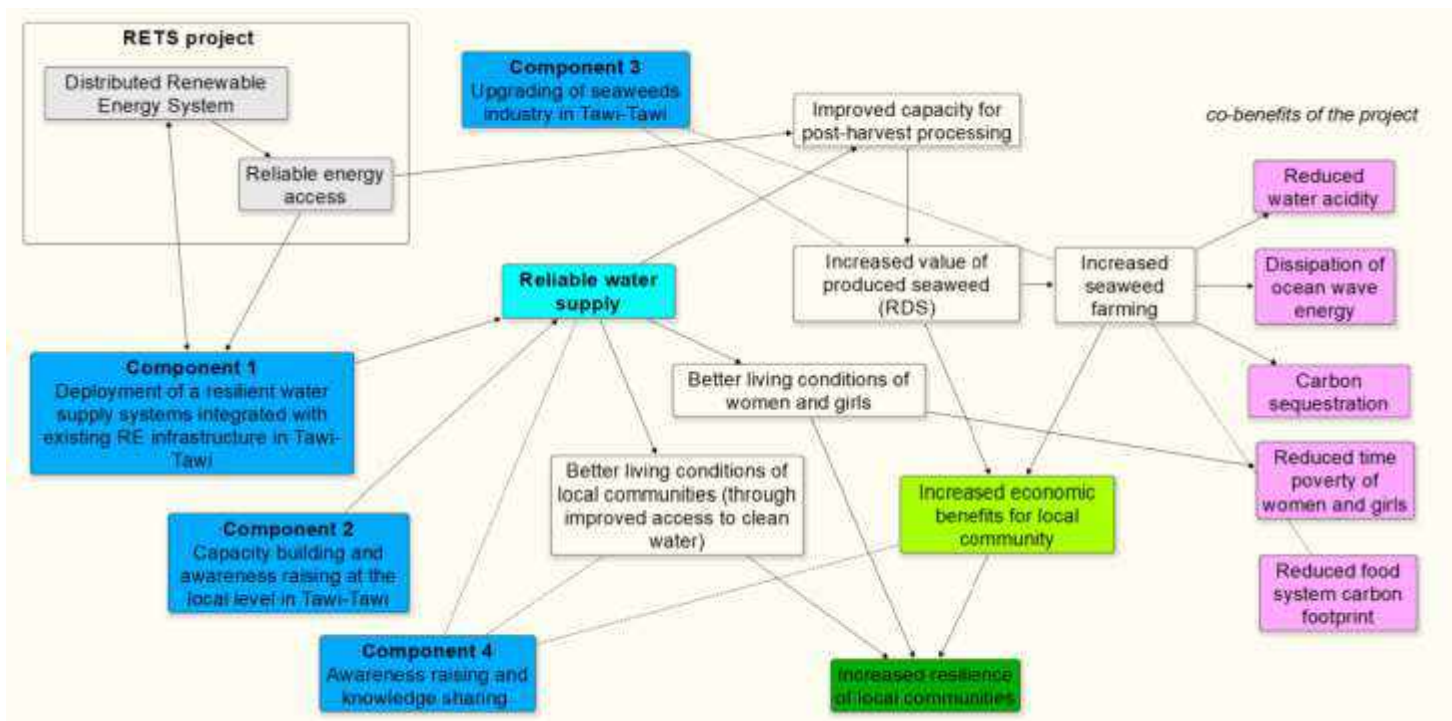


Figure 7. Proposed project intervention (dark blue) and its impact on local communities (short term impacts – light green, long-term result – dark green) and climate/habitats (lilac).  
Source: own elaboration

Increased productivity and expected higher demand for high quality seaweed will lead to increased seaweeds production in the project area. This in turn will lead to maximization of seaweeds farming contribution to climate adaptation with climate mitigation co-benefits. Additionally, the project will strengthen the ecosystem services provided by seaweed and its value for food and nutrition and as a primary source of income and livelihood for the target beneficiaries. Seaweed potential contributions to climate change mitigation and adaptation are also enhanced with improved quality and higher production.<sup>45</sup>

#### Component 1. Deployment of a resilient water supply systems integrated with existing RE infrastructure in Tawi-Tawi

Rising sea-level makes large-scale development of standard groundwater-based water distribution system not feasible in Sitangkai due to increasing salinity (due to increasing seawater intrusion). In Sibutu the groundwater reserves are sufficient for current and future needs of the communities, but the water distribution system is in poor condition and does not meet national standards for drinking water. The two island municipalities do not have a proper water distribution system and with limited access to electricity (prior to the completion of the RETS project, through TAWELCO distribution systems and is available 12-16 hours a day). Inhabitants of those municipalities currently rely on rainwater harvesting and groundwater pumping in sub-standard communal wells<sup>46</sup>.

Water collection at the household level is responsibility of women on the islands. Women spend between 30 minutes and 3 hours per day to collect water. This as well as the use of dirty brackish water impacts the livelihoods of women and girls disproportionately. Therefore, the needs of women and girls will be in the focus of this project component. This reaches from gender-responsive stakeholder consultations, involvement of women during design, implementation as maintenance of the systems, enhancing women's access to clean water and sanitation, creating jobs for women in the operation of the water systems, supporting gender equality and women's empowerment through involvement in decision making, to working with men to reduce gender bias.

**Therefore, this project addresses water scarcity issue through provision of a small-scale desalination plant, powered with decentralized renewable energy (instead of grid powered groundwater wells), as a source of fresh water, and development of a water distribution system in Sitangkai. For Sibutu the project will upgrade the existing water system to meet national standards.**

<sup>45</sup> Duarte, Carlos Mp, et. al. (2017), "Can seaweed farming play a role in climate change mitigation and adaptation," *Frontiers in Marine Science*, vol. 4, article 100, 12 April. <https://www.frontiersin.org/articles/10.3389/fmars.2017.00100/full>.

<sup>46</sup> not conforming to Philippine National Standard for Drinking Water of 2017

The main scope of Component 1 of the project is to develop and upgrade existing water system, making it climate resilient, through:

- Gender-responsive stakeholder consultation and technical design reflecting gender equality – **Activity 1.1.1. and 1.1.2.**
- Deployment of a desalination plant (planned 1 reverse-osmosis plant, with a total capacity of 1000 m<sup>3</sup>/day in Tongmageng, Sitangkai) - **Activity 1.2.1.**
- Deployment of additional PV capacity for powering of desalination plants (1MWp in Tongmageng, Sitangkai) - **Activity 1.2.2.**
- Developing a level 2 water distribution system in Sitangkai - **Activity 1.2.3.**
- Upgrading of existing water wells and water distribution system Sibutu - **Activity 1.3.1.**
- Demonstration of communal rainwater harvesting systems and improved sanitation systems at both islands - **Activities 1.4.1. and 1.4.2.**

On both islands the distribution systems will be developed and upgraded to meet the requirements of relevant Philippine standards, through deployment of disinfection systems, wells rehabilitation, new piping, storage tanks and installing efficient pumps (solar-powered).

### Proposed water system for Sitangkai

Based on the results of the water feasibility study, the two island municipalities do not have a water distribution system and with limited access to electricity (prior to the completion of the RETS project, electricity is provided by NPC-SPUG diesel gensets and TAWELCO distribution systems and is available 12-16 hours a day). These municipalities currently rely on rainwater harvesting and groundwater pumping in sub-standard communal wells<sup>47</sup>.

The water supply and distribution system in Sitangkai Island should meet the estimated water demand which is projected to consider an average standard consumption of 110 liters per capita per day for all purposes. At this rate, the current (year 2022) average water consumption in Sitangkai is 4,281 m<sup>3</sup> per day. This demand is projected considering the average increase in population on the island.

Considering the population and existing water sources, the water demand of about 4,281 m<sup>3</sup> per day can be appropriated through the development of a desalination facility. **Due to current limited demand it is proposed to deploy a modular installation with an initial capacity of a 1,000 CMD desalination facility (Activity 1.2.1.), supported by 1 MWp photovoltaic installation (Activity 1.2.2.), which will secure the current drinking water needs of the households. This installation will be funded with the Adaptation Fund grant.** Additional capacity needed to secure water needs of the population, due to its required large capital investment, would be deployed later within the project and funded with other sources (revenues generated by the Water Districts or loans). It is foreseen that the target desalination plant capacity of ca. 4000 CMD with supporting PV installation, would be fully operational after the project is completed.

**Additional to deployment of the 1,000 CMD desalination system, the project will deploy a Level 2 water distribution system (including rehabilitation identified water sources) in Sitangkai (Activity 1.2.3.),** to ensure, that the water from the desalination plant is available to entire population of Sitangkai addressing water needs, especially prioritizing the clean and potable water. This will ensure the water is available close to the households and eliminate the need to fetch water from Sibutu or other islands by boats.

#### Details of the infrastructure proposed for funding:

The Seawater Reverse Osmosis (SWRO) System is usually an integrated membrane system using ultrafiltration (UF) as pretreatment to seawater reverse osmosis (RO) to produce 1,000 CMD of potable water. The system can be containerized or modular or mobile for quick and easy installation onsite. UF as pretreatment is preferred to produce stable feed water quality to RO which is the next step in the process. The UF filtrate is pumped to a SWRO system to remove the dissolved solids and salts from the water. The SWRO system has cartridge filter for prevention of entry of bigger solids. It will be treated in a single pass RO system with designated number of RO membrane elements to produce 1,000 CMD with 40-45% recovery rate. An anti-scalant is dosed at feed header to prevent the membranes from scaling problems and to have longer RO life span.

Under the Philippine National Standards for Drinking Water (PNSDW) of 2017, the facility shall comply to these guidelines for a safe, clean, and potable water in producing 1,000 CMD. Table below shows the influent (seawater) quality parameters as typical of seawater and the desired drinking water standards. Actual measurements are needed to fine-tune the process parameters and achieve the water quality standards.

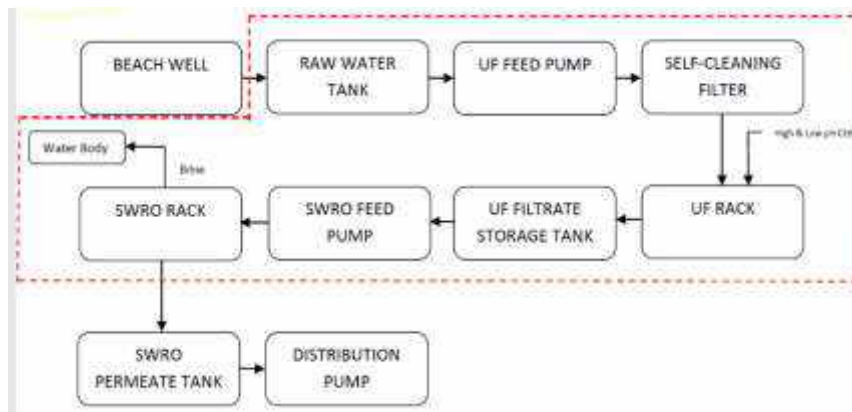
Table 3. Quality parameters as typical of seawater and the desired drinking water standards

Parameters	Influent (feed) Seawater	Drinking Water
------------	--------------------------	----------------



Total Dissolved Solids (TDS)	32,000 - 35,000 mg/L	< 600 mg/L
pH	7-8	6-7
Total Suspended Solids (TSS)	100 mg/L	0 mg/L

The effluent salt concentrate is typically washed back into the sea by pipe dispersion through many ports or by nozzle jets, as the common industry practice. Impact of high salt concentrations in the effluent discharge is usually mitigated by dispersion or dilution of the brine to less than 1 ppt difference over small (<20m radius) area.



**Figure 8. Simplified process flow diagram for sea water reverse osmosis (SWRO) desalination process**

Source: ESIA Study

The modular 1,000 CMD SWRO desalination facility is proposed to be powered by a 1 MWp solar PV power plant to address its off-grid electricity demand using renewable energy resource and avoid GHG emissions. About 0.8-1.0 hectares of land is required for the ground-based PV solar array and accompanying capacity battery energy storage system (BESS) and other support facilities. Additional land requirement for solar PV may be allocated to provide for future energy needs. The system should be able to store up to 1 MWp solar energy and supply the electricity requirement of the SWRO desalination facility and its auxiliary units on a 24-hour basis. Excess energy, when there is any, can be supplied to the existing power grid.



**Figure 9. Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant**

Source: ESIA Study

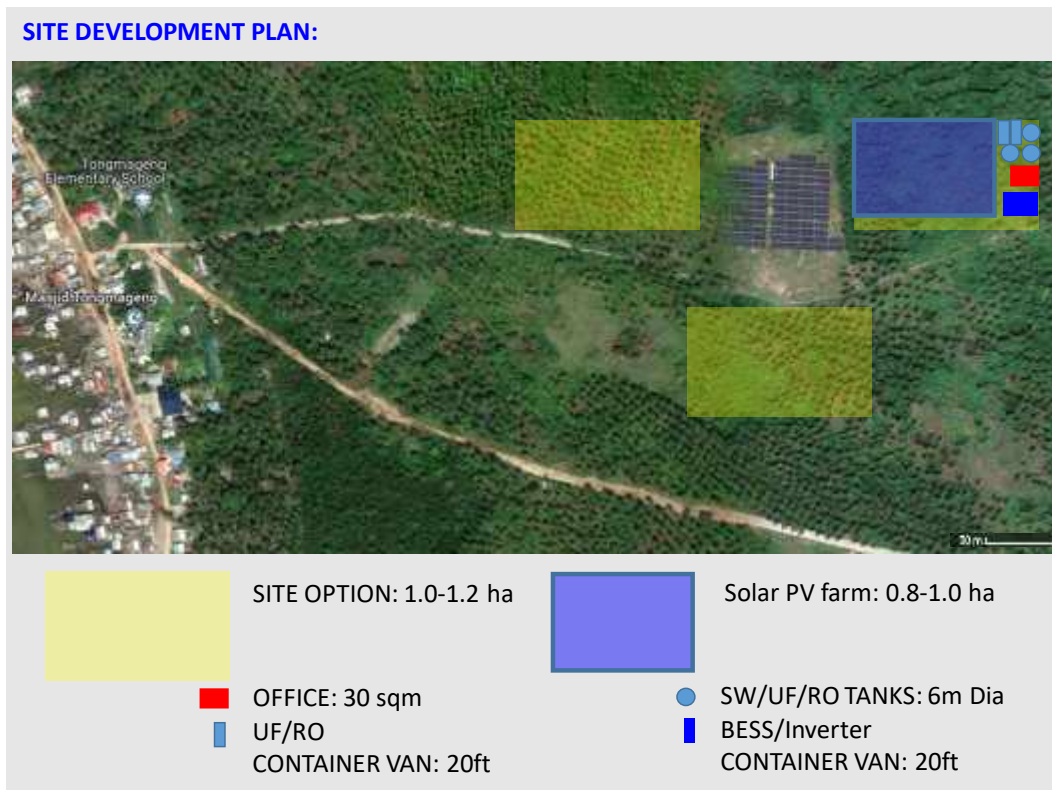
The specific site location is adjacent to an existing Solar PV Power Plant in Tongmageng, Sitangkai. It is about 600 m East from the nearest settlement, 200 m South from the nearest mangrove forest, and 1.4 km West from the port in Barangay Tongmageng, Sitangkai. The site is recommended for the following practical reasons:

- The site has already an existing 1 MWp Solar PV facility, in which the proposed additional 1 MWp for the desalination facility is an expansion;
- The existing Solar PV facility can serve as a backup power supply, with the availability of its hybrid system;
- Excess power generation from the additional 1 MWp solar PV power plant for the desalination facility can be supplied to the power grid;
- It is near an identified ground water source in Tongmageng, Sitangkai, which is another potential source of feed



water to the desalination facility. This will increase the quantity of the drinking water output due to the lower salinity of the groundwater source compared to seawater.

The schematic layout of the development site is shown in Figure 10. Three (3) possible sites of perimeter-fenced 1.0-1.2 ha are recommended (shown in yellow rectangle). The solar PV system, composed of 1670-1820 monocrystalline PV panels, sits in a 0.8-1.0 ha of land (shown in dark blue rectangle). The rest of the facility includes solar inverters and battery storage systems in 20-footer containers, an office building and the containerized or modularized Ultrafiltration and SWRO desalination facilities.



**Figure 10. Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant**  
 Source: ESIA Study

Water distribution system will be designed and deployed in Sitangkai, consisting of water treatment by media filtration and disinfection by chlorination, water storage, piping and distribution network for communities (including remote areas, which could be served by boats operated by the Water District).

### Proposed water system for Sibutu

The water supply and distribution system in Sibutu Island should meet the estimated water demand which is projected to consider an average standard consumption of 110 liters per capita per day for all purposes. At this rate, the current (year 2022) average water consumption in Sibutu is 4,000 m<sup>3</sup> per day. This demand is projected considering the average increase in population on the island. Considering the population and existing water sources in each barangay, the water demand can be appropriately distributed across the 16 barangays through the development and rehabilitation of all its identified water sources, thereby tapping all points of water supply across the island but prioritizing those which are existing and operational. Sibutu has at least 18 known water sources and only nine of which are currently operational (Figure 5.). These sources are in barangays Tongehat, Taungoh, Tandu Banak/Sheik Makdum, Datu Amilhamja Jaafar, Nunukan, Hadji Mohtar Sulayman, Ligayan, and Talisay. The sources in Tongsibalo, Ligayan, Nunukan, Hadji Mohtar Sulayman, and Talisay are all non-operational due to inadequate funds while Nunukan has an untapped water source called Kaban-Kaban pool, which is culturally significance among locals. All water sources in Sibutu are untreated, although physical and chemical properties are moderately within the standards for drinking water. The operational sources provide Level I to Level II water service to the residents except for Tandu Banak/Sheik Makdum, which is providing Level III service but only to a small number of households in these barangays. Wherever these exist, the water supply and distribution pipelines in Sibutu are inadequate, unprotected, not well-maintained, and broken or damaged, resulting in poor, untreated, and unreliable water supply.

**The project will upgrade and extend existing water distribution system to make it reliable and meet national standards for safe drinking water (Activity 1.3.1.).** Water treatment by media filtration and disinfection by chlorination will be utilized for all water supply sources in Sibutu, wherever deemed appropriate, to support other domestic needs. Moreover, a water storage and distribution system with a capacity of about 200-400 m<sup>3</sup> per day or more is proposed for a group of barangays or for a community cluster relative to the water sources and population.

**Proposed collective rainwater harvesting and sanitation systems**

In Sitangkai 97% of households use rainwater for drinking and 82% also use it for domestic purposes, in Sibutu 80% of households use it for drinking and 84.4% also use it for domestic purposes. In groups of households or communities where rainwater harvesting systems are inadequate and rudimentary (Figure 6.), demonstration pilots of suitably designed communal rainwater harvesting systems, are implemented, installed with simple treatment (filtration) and disinfection units, and where stored rainwater can be shared by a cluster of households. Figure ... shows a schematic diagram of a communal rainwater catchment, which may involve a cluster of 8-10 houses within 20-30 m radius, with average total roof area of about 1,200 sqm which can harvest about 15 cubic meters of rainwater, supplying about 2 days' worth of water per cluster. **About 10 pilots will be done across all barangays on both islands (Activity 1.4.1.),** which target community-households built on stilts along the coastlines, canals, and foot bridges and where water supply is scarce and far from the main sources, notwithstanding its brackishness. This will augment the water supply of the island and greatly supplement the water produced from the desalination facility.



**Figure 11. Illustrative example of communal rainwater harvesting clusters**

Source: ESIA Study

Sanitation and hygiene practices on both islands need further improvement to maintain good health and well-being among the people. **About 10 demonstration pilots of suitable and appropriate sanitation systems are proposed for a group of households targeting communities on both islands (Activity 1.4.2.),** built on stilt housing, where shared communal toilets and septic tanks are built within a cluster of houses, supplied with improved rainwater harvesting systems or with improved water supply and distribution. Detailed design options are presented for consideration, selection, and acceptance by the target beneficiaries in the water feasibility study (Taboada et. al., 2022). For example, a comb-like network along the coastlines or a web-like network along canals or foot bridges may be considered for a communal sanitation system serving a cluster of households, whichever is suitable and agreeable by the households. The sanitation systems will be gender-responsive taking into account the special needs of women in a Muslim community.

The deployment of the water supply system will take in due consideration the role of women and girls in water collection, as well as the special needs of women and children access to clean water.

**The detailed design of the proposed systems, including technical specifications, will be done during the project implementation, following gender-responsive stakeholder consultations. The activities and corresponding outputs included in this component are:**

Table 4. Component 1 activities and outputs

Component 1. Deployment of a resilient water supply systems integrated with existing RE infrastructure in Tawi-Tawi	
Outcome 1. Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities	
Activities	Expected Outputs
1.1.1. Gender-responsive stakeholder consultations for the detailed design of the water and sanitation infrastructure	1.1. Water and sanitation infrastructure designed to enhance gender equality and women's empowerment
1.1.2. Technical design of the water and sanitation infrastructure reflects the needs of gender-groups and addresses gender equality and women's empowerment	
1.2.1. Development of reverse-osmosis, modular, 1000 CMD desalination plant in Sitangkai (in Tongmageng)	1.2. Desalination plant commissioned in Tongmageng and water distribution system set up in Sitangkai applying a gender-responsive approach
1.2.2. Addition of 1 MWp PV capacity at Tongmageng hybrid power plant to power the desalination plant	
1.2.3. Upgrading of water distribution system in Sitangkai to level 2	
1.3.1. Rehabilitation and upgrading of existing level 2 water supply systems to level 3 in Sibutu Island	1.3. Water distribution system in Sibutu is retrofitted and upgraded to level 3 according to accepted national technical standards improving women's livelihoods
1.4.1. Installation of pilot collective rainwater harvesting systems in Sitangkai and Sibutu	1.4. Pilot, gender-responsive, collective rainwater harvesting and sanitation systems installed in Sibutu and Sitangkai
1.4.2. Installation of pilot collective, gender-responsive sanitation systems in Sitangkai and Sibutu	

## Component 2. Capacity building and awareness raising at the local level in Tawi-Tawi

The development of the resilient water supply system on both islands will be accompanied by capacity building activities for the LGUs, focused on the design, installation, and operation and maintenance of these systems. This will include support in establishing of the water districts (**Activity 2.1.1. and 2.1.2.**), operational planning and training for the maintenance and servicing of the systems (**Activity 2.1.3.**) supported by awareness raising for gender issues and long-term, gender-transformative development planning in the context of climate change (**Activity 2.2.1. – 2.2.3.**). This component is aimed at sustaining the outcomes of the project.

To ensure proper water distribution and maintenance of the infrastructure deployed under Component 1 of the project, an integrated water resource management (IWRM) system is proposed to be established on a municipal level in Sibutu and Sitangkai. This will be done in the form of organized Water Districts according to the Philippine law<sup>48</sup>, under one water service provider (water district) serving all barangays. **The project will provide consultancy support to LGUs to establish and operationalize Water Districts in Sitangkai and Sibutu (Activity 2.1.1). To ensure proper management of the water system and operations of the established Water Districts, support in financial management of the water system will be provided in the form of digital solutions (IT systems, based on already widely available solutions in the Philippines) and needed infrastructure (satellite internet access and IT hardware) for cashless fees collection (Activity 2.1.2).** Cashless operation is required, due to foreseen large financial transfers during systems operation (it is estimated, based on acceptable water price, PHP 1.00 per liter, that yearly turnover of PHP 330-360 million is expected - equivalent to 6.25 million USD). By ensuring collection of fees by the Water Districts, these may be able to secure funding for proper maintenance of the systems, scale up of the desalination plant capacity and expand water distribution systems to level 3 on both islands. Eventually, when the full-scale system will be developed (desalination capacity of 4,000 CMD), the water rates could be further reduced.

**Additionally, the capacity of Sibutu and Sitangkai LGUs will be built to fully utilize the deployed infrastructure for the benefit of local communities with focus on equitable access to water of all groups, including specific women's needs (Activity 2.1.3).** This will include specific training and sensitization for the needs of vulnerable groups (women and youth). It is planned that part of the revenues from the water system operation on both islands will be utilized for various socio-cultural-educational programs for the municipalities. This could include further construction of sanitation systems and

<sup>48</sup> A water district is a local corporate entity that operates and maintains a water supply system in one or more provincial cities or municipalities. It is established on a local option basis and is classified as a government-owned and controlled corporation or GOCC. A WD is run by a five-man Board of Directors through a General Manager <https://lwua.gov.ph/water-districts/what-is-a-water-district/>.



rainwater-harvesting systems (to reach up to 90-100% of households), WASH programs, health, and wellness programs, continued technical training for women and youth.

Key issues of climate resilient and gender-transformative development planning at LGU level, with focus on water and energy supply in island communities will also be addressed by the project by **awareness raising and capacity building on climate justice and mainstreaming gender and youth (Activity 2.2.1 and 2.2.2)** and **provision of consultancy support to develop and upgrade Local Climate Change Action Plans (Activity 2.2.3).** This will specifically focus on adaptive water management, use of renewables, energy storage, waste and wastewater management with focus on gender and youth mainstreaming.

**The activities and corresponding outputs included in this component are:**

Table 5. Component 2 activities and outputs

<b>Component 2. Capacity building and awareness raising at the local level in Tawi-Tawi</b>	
<b>Outcome 2. Local management structures strengthened, LGUs trained and relevant plans prepared</b>	
<b>Activities</b>	<b>Expected Outputs</b>
2.1.1. Organization and establishment of water districts	2.1. Water service management system in Sibutu and Sitangkai operationalized
2.1.2. Provision of digital solutions for payments and management of the water distribution system	
2.1.3. Building capacity of LGUs in sustainable water and energy system management, in the context of climate change, with focus on equitable access to water for all groups, including specific needs of women and youth	
2.2.1 Awareness raising campaign for LGUs on climate justice with focus on gender, intersectionality and youth	2.2. Local development planning strengthened on gender-transformative climate change adaptation approaches
2.2.2 Capacity building of LGUs on mainstreaming gender and youth into policies and work	
2.2.3. New or updated Local Climate Change Action Plans prepared	

### Component 3. Upgrading of seaweeds industry in Tawi-Tawi

Seaweed farming is one of the major sources of income for the communities in Sitangkai and Sibutu. Increasing disposable income for the communities through increased value of their produced raw, dried seaweed (RDS) contributes to resilience strengthening of the people. Additionally, higher income allows for better nutrition, providing health benefits. The current practice in the two islands is limited to seaweed farming and drying. As consultations with local stakeholders show, this is mainly because communities are limited by lack of capital and lack of access to electricity and water. To produce a better-quality product (with higher market price) the freshwater requirement is 20 kg of freshwater for every kg of seaweeds<sup>49</sup>.

With limited fresh water supply in Tawi-Tawi, processors of dried seaweed find it hard to sustain production even with the electricity supply already provided by the infrastructure established by the RETS project. Therefore, the availability of freshwater through the proposed water distribution system will be crucial in ensuring a sustainable seaweed value chain operation.

Climate change also poses a threat to seaweed farming through increasing sea water temperature, which affects the frequency of occurrence of the ‘ice-ice’ disease, decreasing seaweed production and value. This can be addressed by improved seaweed farming techniques, better organization and better-quality feedstocks.

**The project will help poor communities to capitalize on the water-energy-food nexus to increase their resilience by driving their local economic growth and contributing climate change adaptation and mitigation in a gender sensitive way.**

Under this component, project activities will focus on supporting the communities in Sibutu and Sitangkai in improving their seaweed farming practices, to adapt them to climate change, based on traditional knowledge. **This will include consultancy support provided by the project (Activity 3.1.1.) to design strategies based on gender-responsive, consultative process with seaweed farming families and local stakeholders (actors in seaweed value chain, knowledge partners – MSU TCTO). It will also cover assessment of opportunities to use freshwater and electricity resources for stimulating production of high-quality products. Additional support will be provided (Activity 3.1.2.) for the seaweed**

<sup>49</sup> Based on initial results from water feasibility study (RETS project)

**farming communities through better organization of farmers (farmers cooperatives),** based on previous experiences in this area<sup>50</sup>.

To address specific needs of women in the communities, **the project will provide direct consultative support to women engaged in seaweed farming by establishing and supporting operationalization of women producer groups (Activity 3.2.1.)** to ensure that women will be equally able to lead business activities, participate in and benefit from them. The activity will also include youth-led enterprises and NGOs engaged in the seaweed value chain. Youth empowerment will also be addressed in this through youth-targeted development assistance and engagement of youth as partners.

**Gender dimensions will be streamlined through this component by delivering specific capacity building and awareness raising activities to all groups (men, women, youth) to ensure conscious recognition of women’s role in the seaweed value chain (Activity 3.2.2.).** This will involve working with women, men and youth separately to address the following issues:

- Women’s self-esteem will be enhanced so they are encouraged to talk about their work.
- Men will be made aware and sensitized of women’s involvement in the seaweed value chain.
- Women’s involvement in decision making will be strengthened.

All this requires sensitive work at the community level including moderators/ mediators that help to facilitate discussions and find solutions.

**The activities and corresponding outputs included in this component are:**

**Table 6. Component 3 activities and outputs**

<b>Component 3. Upgrading of seaweeds industry in Tawi-Tawi</b>	
<b>Outcome 3. Seaweed production strategies strengthened in relation to climate change impacts, including variability</b>	
<b>Activities</b>	<b>Expected Outputs</b>
3.1.1. Development of targeted strategy for climate-resilient, gender and youth-focused seaweeds production in the region	3.1. Differentiated gender groups and sub-groups in Seaweed farming communities supported with relevant skills and solutions to address climate change
3.1.2. Direct support to cooperatives provided in value-added seaweed processing	
3.2.1. Strengthening capacity of women in seaweed processing value chain through establishing and supporting women groups	3.2. Seaweed producing women groups on each island established or strengthened with direct capacity building support.
3.2.2. Building awareness on women’s role in the seaweed value chain	

#### Component 4. Awareness raising and knowledge sharing

The project aims at increasing the awareness of climate change in the area and support overall community adaptation to climate change. This component is aimed at sustaining the outcomes of the project.

During the project **specific training and awareness raising campaigns will be delivered to local communities to build their resilience (Activity 4.1.1.).** This will specifically focus on adaptive water management, hygiene and sanitation, use of renewables, and waste management. It will be designed and delivered in a gender-sensitive way.

**Lessons learned in the project will be documented and disseminated through knowledge exchange activities targeted at seaweed farming communities in other regions of the Philippines (activity 4.1.2.).** This component will include wider outreach activities to engage other seaweed farming communities in Tawi-Tawi, BARMM and other provinces, including study tours, site visits focused on good practice transfer and knowledge exchange for seaweed farming and processing, media releases and publications. Relevant training modules capturing knowledge and experiences from the project will be prepared and made available online as well as in printed form for distribution.

All this requires gender sensitive work at the community level including moderators/ mediators that help to facilitate discussions and find solutions. Study tours will engage both women and men, organized in a way to promote at least 40% of female participants.

**The activities and corresponding outputs included in this component are:**

**Table 7. Component 4 activities and outputs**

<sup>50</sup> USAID, “Mindanao Water-Energy Nexus Study Final Report,” Building low emission alternatives to develop economic resilience and sustainability (B-LEADERS) Project, 2017

<b>Component 4. Awareness raising and knowledge sharing</b>	
<b>Outcome 4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared</b>	
<b>Activities</b>	<b>Expected Outputs</b>
4.1.1. Building community resilience through awareness raising of climate change and available adaptation solutions related to water management	4.1. Differentiated gender groups and sub-groups in Local communities trained in climate change adaptation solutions
4.1.2. Disseminate knowledge to other seaweed producing communities in the region (BARMM) and elsewhere (Regions IV-B MIMAROPA and IX Zamboanga Peninsula)	4.2. Knowledge disseminated to other regions with seaweed producing women's groups

## Component 5. Project scaling up

This component is focused on preparatory activities for project scale up, further ensuring sustainability of the intervention. Due to the fact that seaweed farming is widespread in the Philippines in areas with similar problems (water and electricity access) the project is highly scalable in the Philippines context.

Therefore, **the project will create a consultative process, including a wide range of stakeholders at various levels) for the design of a viable scale-up strategy (activity 5.1.1.).**

Finally, **documentation for scaling up of the activities in Tawi-Tawi province, BARMM region and other provinces in the Philippines, through a GCF project concept note (Activity 5.1.2.)** will be delivered. This will leverage project outcomes for the Philippines through private sector or other climate funds.

**The activities and corresponding outputs included in this component are:**

**Table 8. Component 5 activities and outputs**

<b>Component 5. Project scaling up</b>	
<b>Outcome 5. Scaling up of project outcomes facilitated</b>	
<b>Activities</b>	<b>Expected Outputs</b>
5.1.1. Consultation with relevant stakeholders (regional, national, international) including financial institutions, women's groups, youth and donors for the development of scaling up strategy that is gender-transformative	5.1. Documentation and plans for project scale up in the Philippines prepared
5.1.2. Development of a project concept for the GCF	

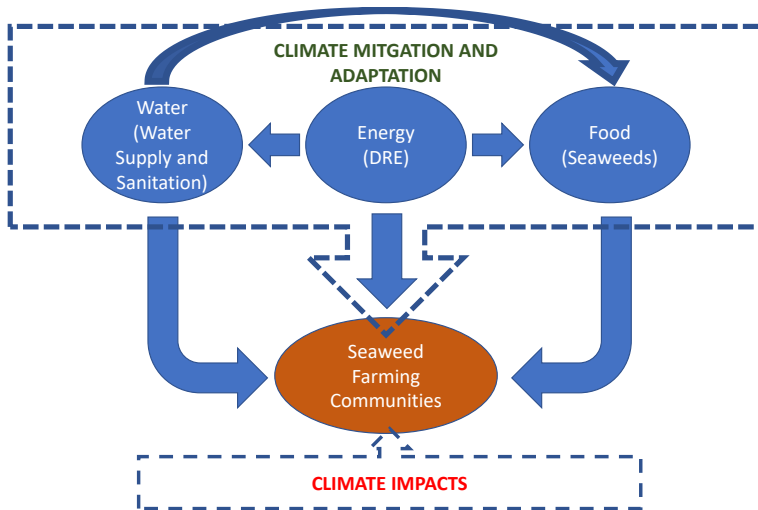
## B. Economic, social and environmental benefits of the project

*Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund*

It is estimated that total of 71,562 people would benefit directly from the project (with 35,423 women and 36,139 men) through resilient water infrastructure provided on the Sibutu and Sitangkai islands. More than 150,000<sup>51</sup> people would benefit indirectly from the project due to knowledge dissemination activities in the region in the seaweeds industry.

The Water-Energy-Food (WEF) Nexus is the main approach used in attaining the above-mentioned objectives and outcomes,

<sup>51</sup> This is estimated on the estimated number of families in Tawi-Tawi directly involved in seaweed farming (30,000) and average household size – 5.8 persons.



**Figure 12. Water – food – energy nexus approach of the project**

Source: own elaboration

focused at achieving economic, social, and environmental benefits.

To avoid and/or mitigate negative impacts that could arise through the project, the project will undergo an Environmental and Social Impact assessment during the project proposal development stage, and all project activities will follow the Environmental and Social Policy and Gender Policy of the Adaptation Fund, as well as the UNIDO Gender Policy. Detailed adaptation intervention (water infrastructure) will be planned based on the results of a water supply feasibility study for the project area, developed in 2022, to avoid maladaptation.

### Economic benefits

Provision of reliable water services strengthened by capacity building activities will lead to increased productivity of local seaweed farmers. This in turn will result in better-quality product (RDS), delivering direct economic benefits to the communities (increased disposable income), stimulating local economy. Increasing the value-addition of seaweed production also improves its

employment generation potential for local communities.

It is also expected that increased availability of water supply and water services will further stimulate other economic activities, including productive uses and small-scale manufacturing enterprise and commercial activities, offering other income opportunities hence further contributing to building economic resilience of seaweed farmers in times when harvest is poor due to environmental conditions or otherwise.

Additionally, water infrastructure will provide an additional base load in the electricity grid, making renewable energy production economically viable. Productive use of water (seaweed processing) will also constitute a base demand for the water distribution system, increasing its feasibility.

The water supply infrastructure will also create direct job opportunities in the infrastructure operation and maintenance.

Availability of reliable water supply is important for the implementation of the National Seaweeds Development Program 2017-2022 (NSDP), including the establishment of land-based nurseries, seaweed tissue culture laboratories, provision of warehouses to intended seaweed farmers cooperatives, and processing of seaweeds into higher value-added products. This is also in line with the objective of the National Seaweeds Development Program to capacitate seaweed farmers to become entrepreneurs (through cooperatives) and improve marketing of seaweeds and increase its value.

### Social benefits

The availability of resilient water supply infrastructure will reduce the vulnerability of seaweed farming communities to emerging climate impacts (reduced availability of fresh water for home and agriculture use, saltwater intrusion into groundwater) as well as contribute to their health, well-being and increased quality of life.

Through provision of reliable and resilient water infrastructure, the project will create following benefit for the local communities:

- Availability of better-quality water for drinking and cooking,
- Better hygiene,
- Better opportunities for women, which are often tasked with water supply in households,
- Increased social security.

Additionally, capacity building activities will be gender mainstreamed. This includes targeted training for women, as well as reducing gender bias and shedding light on the role of women in the seaweed farming value chain, its communities and hence empowering women to fully participate in, benefit from and take leadership in the seaweed value chain.

### Environmental benefits

The Project activities will provide the following direct environmental benefits, through the use of water desalination powered by renewable energy:

- Conservation of ground-water resources of the islands.
- Reduced consumption and waste of single use plastic (plastic bottles for the imported drinking water).



Through contribution of the project to increasing the production of high-quality seaweeds and stimulating seaweed farming in the region, the project will provide the following indirect environmental benefits:

- Limiting ocean acidification thanks to high daytime alkalinity of seaweeds;
- Reducing ocean deoxygenation (caused by raising ocean water temperature);
- Reduce the impacts of sea level rise through the ability to dissipate waves;
- Carbon sequestration in seaweeds biomass;
- Reduced methane emission from livestock when seaweeds are added to livestock feeds.

Additionally, the project provides climate change mitigation co-benefits:

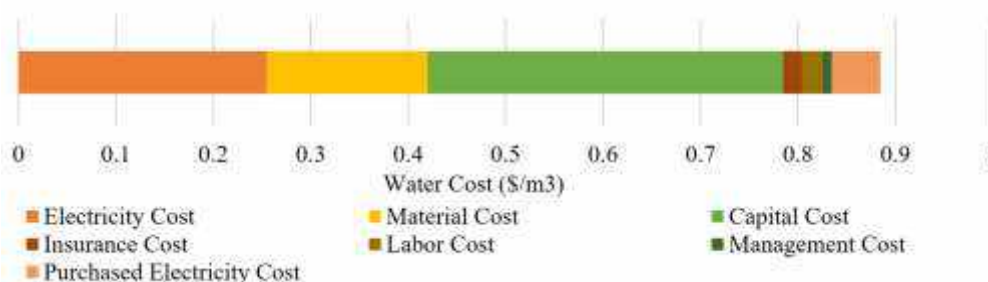
- Mitigation of CO<sub>2</sub> emissions to the atmosphere (reduction of emission from diesel fuel for electricity production);
- Reduction of emissions from water transport between islands (water import);

### C. Analysis of the cost-effectiveness of the proposed project

*Describe or provide an analysis of the cost-effectiveness of the proposed project / programme*

Climate change impacts in the islands (seawater level rise) make investment in the groundwater-based water system not feasible in the long term in Sitangkai due to sea level rise and saline water intrusion into the ground. Also, rainwater harvesting is going to become a less reliable method for the communities water due to less predictable rains. Hence the desalination technology is identified as the most feasible solution for Sitangkai, to address water scarcity. This will be supported by the improvement of the water distribution system for increased reliability and health safety. To reduce the operating cost of the deployed solutions, renewable energy (PV) sources will be utilized to provide electricity for the system. Among available desalination technologies, the reverse osmosis technology is currently the least energy intensive compared to other thermal technologies such as multi-stage flash (MSF) and multiple effect distillation (MED). MSF is the most energy-intensive of the three methods and requires approximately 30 kWh of energy to produce one cubic meter of desalinated water. In comparison, MED and SWRO need approximately 13.5 and 4 kWh of energy to produce one cubic meter of desalinated water, respectively<sup>52</sup>. Additionally, reverse osmosis desalination technology is characterized by the lowest land footprint and flexibility and simplicity of bidding requirements (compared to other technologies). This makes the selection of reverse osmosis desalination plant, powered by renewables (PV) the most suitable and effective solution for the project sites with respect to energy-specific operating costs, land availability and project implementation.

In the final price of the produced water (Levelized Cost of Water) CAPEX is the main cost factor, with electricity being the second and material (membranes) the third (Figure 8.). For the operating costs the energy cost is the highest factor, reaching about 45% of the total OPEX. Therefore, by providing renewable energy (PV) as the main power source for the desalination plant, the project will significantly reduce the operational cost of the infrastructure.



**Figure 13. Average cost breakdown (Levelized Cost of Water) for large reverse osmosis desalination plants**

Source: Mohammadi et al., (2020)

To additionally increase the cost effectiveness of the intervention, the project will include rehabilitation and upgrading of existing water infrastructure instead of investing in completely new infrastructure.

**Table 9. Cost estimation for the infrastructure and equipment for the water system**

Source: Taboada E.B. et. al., op.cit

Unit quantity	System description	Indicative Price Range (PhP)
---------------	--------------------	------------------------------

<sup>52</sup> Mohammadi F., Sahraei-Ardakani M., Al-Abdullah Y., Thomas Heydt G., (2020) Cost-Benefit Analysis of Desalination: A Power Market Opportunity, Electric Power Components and Systems, 48:11, 1091-1101, DOI: 10.1080/15325008.2020.1829188

1 set	Water Disinfection (Chlorination) System for water tanks, complete with all gadgets and operational support and service, including delivery and logistics to major ports	PhP 100,000 – 150,000
1 set	Submersible pumps, complete with gadgets and fittings, including delivery and transport to major ports	PhP 150,000 – 200,000
1 set	Piping and distribution system, including all materials, fittings, delivery and transport costs to major ports	PhP 5,000 – 10,000 per 20 m distance
1 set	Primary Filtration System or Water Softening System, to treat fresh water resources, which do not pass the water quality analysis (e.g. TDS, mineral content, salt content, others), choices are dependent on water analysis results and flow rates; including delivery and transport costs to major ports	PhP 100,000 – 150,000
1 set	Desalination Facility, including installation and commissioning, delivery to major ports, excluding civil works, land preparation, building construction	PhP 100,000,000 for a capacity of 1,000 m <sup>3</sup> /d  PhP 70,000,000 for a capacity of 500 m <sup>3</sup> /d
1 set	Water Laboratory, complete with basic water analysis equipment for each Water Service Provider; excluding civil works, land preparation and building construction	PhP 50,000,000 - 75,000,000

Notes:

1. 1000 PhP ~ 18 USD
2. These indicative costs are based on price quotations from various suppliers, which have usually a validity period of 90 days and excludes VAT.
3. Delivery and transport of goods are up to the major ports only, unless specified.
4. Labor and transport costs (specifically to Sibutu and Sitangkai) are excluded.
5. Actual costs may vary depending on brand, capacity, sizing, and material type.

The cost breakdown for the desalination facility is given in the table below.

**Table 10. Cost estimation (CAPEX, OPEX) and estimated water price for the desalination facility**

Source: Taboada E.B. et. al., op.cit.

Parameters	Capacity of Desalination Facility	
	500 CMD	1,000 CMD
Equipment costs, PhP	70,000,000	100,000,000
Costs of ancillary equipment including storage tanks, pumps, distribution systems, and others, PhP	7,000,000	10,000,000
Costs of building platform structure and supporting facilities, PhP	5,000,000	5,000,000
Labor, installation, testing, logistics, startup, and other costs, PhP	7,000,000	10,000,000
<b>Total Capital Expenditures</b>	<b>89,000,000</b>	<b>125,000,000</b>
Interest Rate, %	15%	15%
Payback Period, yrs	5	5
<i>Estimated Annual Costs</i>		
Depreciation Costs, PhP/yr	18,608,949.76	26,136,185.39
Electricity costs, PhP/yr	13,961,250.00	27,922,500.00
Labor costs, PhP/yr	3,276,000.00	3,276,000.00
Repairs and maintenance cost, PhP/yr	930,447.49	1,306,806.27
Other costs, PhP/yr	465,223.74	653,404.13
<b>Total Annual Costs</b>	<b>37,241,870.99</b>	<b>59,294,877.79</b>
Water produced, cbm/yr	182,500	365,000
<b>Water Price (excluding taxes), PhP/cbm</b>	<b>204.07</b>	<b>162.45</b>

Based on the assumptions given in the Water Feasibility Study for the desalination facility in Tongmageng, the potable water price is estimated at PhP 204.07 per cubic meter for a 500-CMD capacity and PhP 162.45 per cubic meter at a doubled capacity of 1,000 CMD. This analysis does not include the grant funding from the Adaptation Fund, which would cover the CAPEX cost. Also, electricity cost will be significantly reduced due to implementation of 1 MWp PV installation to power the system. With the estimated price, the project provides big benefit for the communities of Sitangkai Island, who procure potable water at a price of at least PhP 1,000 per cubic meter (or PhP 200 per 200-L drum).

The maintenance costs of the deployed systems (OPEX) will be budgeted by the LGUs<sup>53</sup> through the established water districts, secured with income from a proposed equitable water tariff (competitive to imported, bottled water), which will be introduced to provide adequate funding for the system operation (based on relevant analysis and consultation with local stakeholders the willingness to pay has been established).

Thanks to the grant funding (covering the CAPEX) the established water districts would be able avoid loans for the investment, and therefore leverage needed capital for further expansion of the water system (expansion of the desalination

<sup>53</sup> Section 17 of the Local Government Code of the Philippines directs LGUs to endeavor to be self-reliant and grants powers for essential services and facilities. Thus, LGUs assume responsibility in providing critical services such as water supply, sanitation, and flood control, including enforcement of sanitation laws.

facility to 4000 CMD) to ensure supply of water for the entire prospective demand (not only for basic needs) of the population. This way the AF funding would have a catalytic role in the development of reliable water supply for the two islands.

The cost structure of the project is designed to ensure economic sustainability of the intervention and includes sources of capital for the investment and supplementary activities aimed at supporting the beneficiaries in operation of the infrastructure. Cost effectiveness of the project (considering the project grant) – **the cost of providing reliable water supply to the islands of Sitangkai and Sibutu is estimated at less than 104 USD per inhabitant.** This includes CAPEX expenditures for infrastructure as well as capacity building and awareness raising as well as other soft activities aimed at increasing resilience, and project execution and implementation cost.

**Table 11. Cost of the intervention per beneficiary**

Population (direct beneficiaries)	71,562
Cost per person (investment budget - component 1+2)	\$80.49
Cost per person (project activities budget - components 1-5)	\$87.90
Cost per person (total grant, incl. exec. cost and impl. fee)	\$103.86

#### **D. Consistency with national or sub-national strategies and policies**

*Describe how the project is consistent with national or sub-national sustainable development strategies, including, where appropriate, national adaptation plan (NAP), national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.*

##### **Ambisyon Natin 2040**

Ambisyon Natin 2040 envisions that all Filipinos experience a strongly rooted (Matatag), comfortable (Maginhawa), and secure life (Panatag na Buhay) by 2040. “With this vision, Filipinos are hoped to demonstrate close family ties and strong sense of community; Filipinos are free from poverty and hunger; Filipinos live long and enjoy a comfortable life; and Filipinos are protected by a clean and fair government.” Ambisyon Natin 2040 aims to increase the quality of life of Filipinos. The proposed project aims to contribute to poverty reduction and increased quality of life in the two island municipalities of Sitangkai and Sibutu by increasing access to electricity and water supply services, which are basic human necessities. The proposed project also aims to increase the economic resilience of seaweeds farming communities, further contributing to poverty reduction and better quality of life, by improving the productivity seaweeds farms and quality of RDS, improving their price.

##### **PDP (Philippine Development Plan)**

The Philippine Development Plan 2023-2028<sup>54</sup> (PDP) serves as the country’s overall blueprint in development planning for the next six years. It reflects the government’s policies, strategies, programs, and legislative priorities in support of and consistent with Socioeconomic Agenda. The Plan is geared toward the attainment of the country’s long-term vision, the Ambisyon Natin 2040, where all Filipinos are envisioned to enjoy strongly rooted, comfortable, and secure lives. One of the priorities of the PDP is to promote green and blue economy to optimize their contribution to livelihood and employment generation while improving environmental and social well-being.

The PDP focuses strongly on economic or production sector (aiming at modernization of agriculture and agri-business to raise overall productivity, move Philippine products up the value chain, promote diversification, and ensure food security) and social and human development sector (to boost health through interventions leading to healthy schools, communities, workplaces, and lifestyles). PDP aims at establishing livable communities by upgrading and planning human settlements and ensuring food security and proper nutrition through production and effective supply management.

The proposed project, by increasing access to resilient water and sanitation infrastructure, increasing the economic resilience of seaweed farming communities, and increasing climate awareness and adaptive capacity of local governments and communities is in line with the PDP strategic framework. It implements the following specific objectives of the PDP:

- Improve access to food, health, education, safe drinking water, basic sanitation, social services, social protection, and quality jobs;
- Build disaster preparedness and resilience of communities;
- Ensure availability of utilities.

##### **NDC (Nationally Determined Contributions)**

<sup>54</sup> <https://pdp.neda.gov.ph/philippine-development-plan-2023-2028/>

Through the NDC<sup>55</sup>, the Philippines commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional and 72.29% is conditional, representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy.

The proposed project, by utilizing clean and efficient energy technologies based on renewable energy resources to power the water supply systems, contributes even if in a small way to this NDC target.

The NDC also recognizes the importance of capacity building in increasing the adaptive capacity of the country. Indeed, the proposed project through its capacity building and awareness components aims to contribute to addressing the very poor adaptive capacity of the Province of Tawi-Tawi.

The NDC also recognizes the importance bilateral, regional and multilateral cooperation in implementing the mitigation commitments. The project will be a continuing cooperation between MINDA and the UNIDO, among other partners, in the Province of Tawi-Tawi, in fact, building on an ongoing cooperation to address the poor electricity access in the two island municipalities through renewable energy.

The NDC upholds the NCCAP, the PDP, and the PEP among other national sustainable development plan and frameworks in achieving the country's commitment to this global goal.

### **National Framework Strategy on Climate Change (NFSCC)/NCCAP (National Climate Change Action Plan)/NAP (National Adaptation Plan)**

The National Framework Strategy on Climate Change (NFSCC) was established by the Climate Change Act (RA 9729) in 2009, to guide the country in developing programs and policies in response to climate change. The main goal of the framework strategy is to build the adaptive capacity of communities and increase the resilience of natural ecosystems to climate change and optimize mitigation opportunities towards sustainable development. The NFSCC envisions a climate risk-resilient Philippines with healthy, safe, prosperous, and self-reliant communities, and thriving and productive ecosystems. Further, it also highlights the mutually beneficial relationship between climate change mitigation and adaptation. The NFSCC serves as the framework for the development of local and national climate change action plans.

The NFSCC serves as the roadmap for increasing the country's social and economic adaptive capacity, the resilience of its ecosystems, and the best use of mitigation and finance opportunities. The NFSCC defines the overall parameters for developing a national action plan. It identified adaptation as the anchor strategy and considered mitigation as a function of adaptation.

The NCCAP details the long-term agenda of the country at all levels of government for climate change adaptation and mitigation covering the period of 2011 to 2028, which is divided into three 6-year phases that coincide with the terms of the Philippine Development Plan (PDP) and the national electoral and planning cycles. The NCCAP's ultimate goal is to "build the adaptive capacities of women and men in their communities, increase the resilience of vulnerable sectors and natural ecosystems to climate change and optimize mitigation opportunities towards gender-responsive and rights-based sustainable development." It identifies communities and areas most vulnerable to adverse impacts (of climate change) and considers differential impacts on women, children and marginalized populations.

The project will directly contribute to most of the key strategic priorities and expected outcomes of the NCCAP, namely, food security, water sufficiency, ecological and environmental stability, sustainable energy, and knowledge and capacity development.

A key strategic priority of the NCCAP that impacts the achievement and cuts across its other key priorities is knowledge and capacity development. Its goal is to enhance capacity for climate change adaptation, mitigation, and disaster risk reduction at the local and community level. One of the overall objectives of the proposed project "Increase climate awareness and adaptive capacity of LGUs in Tawi-Tawi and seaweeds production communities" contributes directly to achieving this climate strategy. As its adaptation measures for the energy sector, the NCCAP aims for the climate-proofing, rehabilitation and improvement of energy and transport systems and infrastructures. Thus, one long-term goal under the NCCAP is to mainstream adaptation in energy development projects by climate proofing of energy infrastructures and systems to withstand extreme weather phenomena and conditions induced or caused by climate change.

### **NDRRMP (National Disaster Risk Reduction and Management Plan)**

The proposed project contributes to the overarching goal of the NDRRMP of a "safe, adaptive, and disaster-resilient Filipino communities towards sustainable development" by building resilient electricity and water supply infrastructures, increasing knowledge and skills, and reducing vulnerabilities of seaweeds farming communities by increasing their economic resilience. The project directly upholds one of the key results areas of the NDRRMP, which is Disaster Risk Reduction. The infrastructure investments in the project represents a key strategic action under the NDRRMP, which is Investing for Resilience, as well as contribute directly to one expected outcome, which is Increased structural integrity of critical infrastructure (besides housing and building). On the other hand, the capacity building component of the project, including

<sup>55</sup> REPUBLIC OF THE PHILIPPINES Nationally Determined Contribution Communicated to the UNFCCC on 15 April 2021  
<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Philippines%20First/Philippines%20-%20NDC.pdf>



activities to increase awareness of all stakeholders and target beneficiaries and capacity of local governments, represent two other strategic actions under the Plan, which are Understanding Risk and Strengthening Risk Governance, as well as contribute to these expected outcomes of the Plan: Enhanced risk awareness and risk-informed decisions and actions of governments and communities; and Increased institutional capacities of local DRRM offices.

The NDRRMP includes recommendations on comprehensive actions that should be taken at the local levels to increase resilience and adaptive capacity of communities. These actions should be considered in the final design of the activities in the proposed project.

### **Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP)**

The PAP4SCP aims that natural resources are efficiently used and equitably allocated, and in this regard, innovation and investment in green technologies and systems increased. The proposed project will build water supply systems that will be powered largely by solar PV. The proposed repair and rehabilitation of existing water supply infrastructures and construction of desalination plants, also powered by the solar PV mini-grid, will contribute to the equitable allocation of water resources in the two island municipalities.

### **PWSSR (Philippine Water Supply Sector Roadmap)**

The proposed project is aligned to the vision and strategies of the Philippine Water Supply Sector Roadmap (PWSSR)<sup>56</sup>. The PWSSR had envisioned that:

- 3) By 2010, 432 waterless municipalities shall have graduated to more than 50% access coverage and sustaining utility operations; that existing formal/legal utilities are expanding coverage to unserved areas, and that 60% of water service providers shall have been regulated from the current 40% level.
- 4) By 2015, the water supply sector shall have achieved the MDG target of halving the proportion of the population without sustainable access to safe drinking water and basic sanitation.
- 5) By 2025, universal access coverage and sustained utility operations have been attained; that existing formal/legal utilities continue to expand coverage at par with population growth, and; that all water service providers shall have been regulated.

Along with the 2025 target, the Roadmap calls for the: “Timely provision of adequate water supply facilities from source development to distribution,” that is, “Water supply demand by the population is met through adequate and sustainable infrastructure.” In this regard, the Roadmap targets that Level II and Level III water systems are provided supposedly in the medium term (2015) in areas/communities with less than 50% service.

“The LGUs are responsible for the delivery of basic services including water supply and sanitation under the Local Government Code of 1991 while other agencies are providing support to LGUs and the WSPs in implementing their mandates and responsibilities.” So the Roadmap includes a strategy in building the capacity of LGUs, among other stakeholders, to support the delivery of water supply services with the provision of additional water supply facilities through infrastructure development

Philippine Water Supply and Sanitation Master Plan, 2019-2030 (PWSSMP) identified eight reform areas, namely: (1) establishing effective WSS sector institutions; (2) strengthening regulatory environment; (3) balancing water supply and demand; (4) building climate resiliency; (5) creating and ensuring effective WSS services; (6) enabling access to funding and financing; (7) managing data and information; and, (8) driving research and development.

### **PEP (Philippine Energy Plan)**

For the long-term (2017-2040), the DOE will be guided by the eight Energy Sector Strategic Directions. It focuses on securing reliable energy supply, expanding electricity access to all consumers, protecting consumer welfare, and ensuring high level of consumer satisfaction. In addition, Strategic Direction 3 “Promote Low Carbon Future” refers to energy efficiency and renewable energy. The proposed project contributes directly to the renewable energy, energy efficiency and conservation, and energy resiliency policy and programs of the government through the PEP.

### **National Renewable Energy Program (NREP) 2020-2040**

The NREP 2020-2040 aims to contribute to consumer empowerment by increasing the adoption and application of renewable energy in rural areas not only to increase access to electricity but also to exploit its applications in delivering basic social and economic services particularly in the agriculture, fisheries, health, and education sectors. The proposed desalination plants and retrofitted or rehabilitated communal water systems will be powered by the hybrid RE mini-grids to the extent that these could be connected to the mini-grid. Otherwise, these water supply systems will be powered by decentralized or stand-alone solar PV systems.

### **Energy Efficiency and Conservation Program**

The project will also rehabilitate the communal water supply systems so that they conform to energy efficiency standards (for

---

<sup>56</sup> <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps2033.pdf>

example, using high efficiency motors for its water pumps and the premises are well lighted using more efficient lighting systems). Needless to say, the desalination plants will be installed using energy-efficient electrical and mechanical systems that conform to the national electrical safety code (Philippine Electrical Code).

### **Energy Resiliency Policy and Program**

In response to Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121), the DOE issued DC 2018-01-0001 Adoption of Energy Resiliency in the Planning and Programming of the Energy Sector to Mitigate Potential Impacts of Disasters on 17 January 2018 to guide its Energy Resiliency Policy (ERP). The ERP's guiding principles are a) strengthen existing energy infrastructure; b) implement the build back better principle in terms of reconstruction and rehabilitations of damaged infrastructure; c) improve existing operational, maintenance and practices to ensure continuous operations and energy supply; and d) develop resiliency standards that will be used as basis in future construction of energy facilities.

On top of upgrading the capacity of the hybrid RE mini-grids in the two islands, which are nearing completion at this writing, the proposed project seeks to further "harden" the existing power supply infrastructures to make it more resilient to climate risks and ensure supply of clean energy to the water supply systems even in times of extreme weathers.

### **E. Relevant national technical standards and environmental standards**

*Describe how the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.*

The project activities will adhere to all relevant national technical standards in the field of infrastructure and services, applicable to:

- civil works and construction materials,
- drinking water quality,
- sanitation,
- waste management,
- photovoltaics and electric equipment,
- good aquaculture and raw dried seaweeds.

**Compliance with national standards and regulations will be required from all contractors through the provision of relevant clauses in contract agreements.** Main applicable standards and regulations include:

- The National Building Code (P.D. 1096) apply to the design, location, siting, construction, alteration, repair, conversion, use, occupancy, maintenance, moving, demolition of, and addition to public and private buildings and structures, except traditional indigenous family dwellings. Therefore, all structures built within the project will need to comply with the Code. All construction materials and equipment will comply with existing relevant standards<sup>57</sup>.
- Philippine National Standard for Drinking Water of 2017: includes technical standards for the quality of drinking water, water sampling and examination, and other mode of distribution of drinking water. These standards apply and shall be complied with by bulk water suppliers, among other drinking water service providers.
- Presidential Decree (PD) 856 of 1976: Sanitation Code of the Philippines. As amended and modified by the Philippine Clean Water Act (RA 9275), this covers the national sanitation management program, whereby LGUs shared the responsibility of ensuring the implementation and enforcement of the domestic water, sanitation, and hygiene (WASH) programs in their respective jurisdictions.
- Republic Act 9003 of 2000: Ecological Solid Waste Management Act. This is an Act providing for an ecological solid waste management program, which set the guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures, including composting, recycling, reuse, recovery, and others, before collection, treatment, and disposal in appropriate and environmentally-sound solid waste management facilities in accordance with ecologically sustainable development principles. Further, it mandates the LGUs to be primarily responsible for the implementation and enforcement of holistic solid waste management and the rest of the relevant provisions of the Act within their respective jurisdictions. The project
- Toxic Substances and Hazardous Waste Management Act (RA 6969), is delineating the guidelines and regulations covering subject matter. LGUs have shared responsibility in implementing and enforcing this regulation within their jurisdictions.
- Philippine National Standard on the Code for Good Aquaculture Practices for Seaweed (PNS/BAFS 208:2021)<sup>58</sup>

<sup>57</sup> E.g. the Government Procurement Policy Board (GPPB) provides relevant guidance on applicable standards:

<https://www.gppb.gov.ph/laws/laws/CPESGuidelines2011/Annex12.pdf>

<sup>58</sup> [https://bafs.da.gov.ph/bafs\\_admin/admin\\_page/pns\\_file/2021-10-19-PNS%20BAFS%2020208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20\(GaQP\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-10-19-PNS%20BAFS%2020208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20(GaQP).pdf)

covers practices that aim to prevent or minimize the risk associated with the production and harvesting of seaweed in brackish and marine waters either in land-based or sea-based facilities including the gathering of those washed-ashore and wild stock. This Code covers the aspects of production and harvesting, and addressing food safety and quality, plant health, environmental integrity and socio-economic welfare. This Code applies to production areas where seaweeds are farmed and harvested.

- Philippine National Standard (PNS) for Dried Raw Seaweed (PNS/BAFS 85:2021)<sup>59</sup> prescribes quality specifications and safety requirements of dried raw seaweed of the class Rhodophyceae (red seaweed) such as but not limited to *Kappaphycus spp.* And *Euचेuma spp.*

The project follows the relevant laws and regulations for the environmental assessment and requirements:

- Environmental Impact Assessment Law (PD 1586)
- Ecological Solid Waste Management Act (RA 9003)
- Toxic Substances and Hazardous Waste Management Act (RA 6969)
- Environmental Awareness and Education Act of 2009 (RA 9512)
- Clean Air Act of 1999 (RA 8749).

The project complies with the Environmental and Social Policy (ESP) of the Adaptation Fund - Environmental and Social Impact assessment has been done for the project and project implementation will strictly follow the ESMP. Detailed information has been provided in the Annex A. Environmental and Social Impact Assessment Study.

## F. Duplication with other funding sources

*Describe if there is duplication of project with other funding sources, if any.*

There is no identified duplication of the project with other funding sources. The following activities in the project area have been identified, with a scope relevant to the proposed project.

### 1. The Mindanao Water Supply Program of MinDA (MinDA Water) and BARMM water project

The MinDA program aims to:

- 1) Increase access to water supply for drinking and for irrigation;
- 2) Increase access to sanitation and hygiene facilities to reduce water-related diseases;
- 3) Improve productivity of farmers in the geographically isolated and disadvantaged areas,
- 4) Enhance capacities of LGUs or its LGU-run Water Utilities, Potable Water Service Providers and Irrigation Service Providers in the operations and management to ensure sustainability.

The program has 3 components: Infrastructure Development, Technical Assistance and Capacity building, and Governance Reform and Institutional Development. MinDA partners with DILG and DBP for the implementation of the program, with DBP providing the financing for the infrastructure component.

The Ministry of the Interior and Local Government (MILG) installed in the island provinces of Sulu and Tawi-Tawi ten (10) small desalination facilities, to address the scarcity of potable water in the area in the municipalities of Pangutaran, Pata, Hadji Panglima Tahil, and Pandami. These facilities have been very well received by local communities. This intervention focuses only on installation of small RO plants with limited capacity and operation time (to 10 hours per day), without any water distribution system and supporting activities. Sibutu and Sitangkai islands have not been included in the program.

### 2. RETS project

MINDA and UNIDO, together with Tawi-Tawi Electric Cooperative, Inc (TAWELCO), local governments and BARMM government have implemented the Renewable Energy Technology to Increase Value Added of Seaweeds in Tawi-Tawi (RETS) project in Tawi-Tawi with co-funding from the European Union's Access to Sustainable Energy Programme (EU-ASEP) and the support of the Department of Energy (DOE) and the National Electrification Administration (NEA).

The project area covers the municipalities of Sitangkai (Barangay Tongmageng) and Sibutu (Barangay Taungoh) in Tawi-Tawi<sup>60</sup>, part of BARMM. The RETS project aimed to increase and extend the availability of electricity service in these island municipalities that are home to about 15,000 seaweed farmers, through the renewable energy hybridization of the island grids in the municipalities of Sitangkai and Sibutu.

The RETS project had the following Outputs:

---

<sup>59</sup> [https://bafs.da.gov.ph/bafs\\_admin/admin\\_page/pns\\_file/PNSBAFS-85-2021-Raw-Dried-Seaweed.pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS-85-2021-Raw-Dried-Seaweed.pdf)

<sup>60</sup> Also Panglima Sugala and Tandubas in Tawi-Tawi are targeted areas of the RETS project



- Output 1. RE-hybrid systems are implemented in Sitangkai and Sibutu; Feasible decentralized RE systems for the seaweed value chain are developed in Panglima Sugala and Tandubas.
- Output 2. Appropriate water supply systems are assessed and designed integral to the RE hybrid systems.
- Output 3. The plans, programs, and projects of BFAR to increase production of higher quality raw dried seaweeds (RDS) are facilitated.
- Output 4. The plans, programs, and projects of the local government units (LGUs) to improve the delivery of economic and community social and welfare services are facilitated.

The results of the RETS project include provision of energy access to 5,000 households, extend operation of energy infrastructure to 24 hours as well as the development of feasibility study for water supply systems. The project has also conducted a value chain analysis of seaweeds in Tawi-Tawi, including other applications of renewable energy technologies and deployed floating solar dryer in Sitangkai and Sibutu in cooperation with DOST through MSU-TCTO, one of the RETS project partners. The following outputs of the RETS project constitute a baseline for the proposed adaptation project:

**Table 12. Linkages of the RETS project with the proposed adaptation project**

RETS project output	Status of the activity	Relevance for the Adaptation project
RE-hybrid systems are implemented in Sitangkai and Sibutu	Deployed 1004 kWp PV + 640 kW diesel gen-set + 824 kWh Li-ion storage in Sitangkai and 648 kWp PV + 480 kW diesel gen-set + 612 kWh Li-ion storage in Sibutu. Planned operation start in 2023.	The deployed electricity generation sources will be upgraded and utilised as a primary source of energy for the deployed and upgraded water infrastructure. The desalination plant will provide a baseload for the upgraded RETS-deployed infrastructure, additional 1MWp capacity will be added to the existing site.
Appropriate water supply systems are assessed and designed integral to the RE hybrid systems	The water feasibility study was developed by local consultants in June 2022.	The feasibility study provided crucial input to the adaptation project – the findings of the study informed the design of the system to be funded by the Adaptation Fund.



**Figure 14. Photovoltaic plants and diesel generators deployed by the RETS project in Sibutu and Sitangkai, as of October 2021.**  
Source: *The RETS project*

Through improved access to energy services, the RETS project also contributes towards increasing the production of raw dried seaweeds, as electricity is utilized for powering of equipment for processing. This furthermore supports the increase in income and employment generation potential through the availability of electricity services and use of renewable energy technologies. The proposed adaptation project will build on that and complement this activity through the improved availability of fresh water.

The RETS project has finished implementation in April 2023 and constitutes a baseline for the proposed project.

### 3. The I-PURE Project<sup>61</sup>

The Integration of Productive Uses of Renewable Energy for Inclusive and Sustainable Energization in Mindanao or I-PURE Mindanao Project is a cooperation between the National Electrification Administration (NEA) and the Mindanao Development Authority (MinDA) with a Euro 4.5 million funding from the European Union - Supported Access to Sustainable Energy

<sup>61</sup> <https://www.facebook.com/IPureMindanao/>

Programme (EU-ASEP).

The overall objective of the I-PURE Project is to bring about inclusive and sustainable social and economic development to the sites through improved livelihood activities and sustainable access to energy through renewable energy solutions. Aligned to this objective, the central precept to the selection of the activities and sites for the project is the shift from the traditional practices of deploying renewable energy technologies for stand-alone household energy applications (lighting, radio, others) to a solution that combines renewable energy solutions for livelihood activities and household energization.

The I-PURE Mindanao Project is being implemented in the franchise areas of South Cotabato II Electric Cooperative, Inc., Sultan Kudarat Electric Cooperative, Inc., Tawi-Tawi Electric Cooperative, Inc. (TAWELCO), and Cotelco, Inc.. and in the municipalities of Sitangkai Tawi-Tawi, Sibutu Tawi-Tawi, Arakan N.Cotabato, Kidapawan N.Cotabato, Tulunan N.Cotabato, Bagumbayan Sultan Kudarat, Kalamansig Sultan Kudarat, Ninoy Aquino Sultan Kudarat, Lebak Sultan Kudarat, Glan Sarangani, and Picong Lanao del Sur.

In Sibutu and Sitangkai, the project is deploying 12 units of the dome-type solar-assisted seaweed dryers.

#### 4. SeaRDeC

The Department of Science and Technology is funding the research program "Establishment of the Seaweed Research and Development Center (SeaRDeC) to support the Seaweed Industry in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM):" The program has 3 component projects:

- Project 1: Optimization of laboratory and land-based nursery culture technologies of *Kappaphycus* spp. and *Eucheuma denticulatum* – Prof. Karen B. Serag, Project Leader
- Project 2: Molecular characterization, selection, and production of high quality eucheumatoid cultivars in the Bangsamoro Autonomous Region in Muslim Mindanao  
Dr. Sitti Zayda B. Halun, Program/Project Leader
- Project 3: Optimization of post-harvest handling of *Kappaphycus* spp. and *Eucheuma denticulatum* – Dr. Sitti Zayda B. Halun, Program/project Leader

The general objectives of the program are to optimize the seaweed (*Kappaphycus* and *Eucheuma*) value chain in Tawi-Tawi and create and promote a commercially sustainable cultivated seaweed industry in the BARMM. Its ultimate objectives are:

- Better quality of life of seaweed farmers
- Sustainable seaweed industry
- Raw dried seaweeds that meet the Philippine national quality standards

Its targets are:

- 15% increase in seaweed production in Tawi-Tawi
- 20% increase in annual income of farmers by 2023

The specific objectives to meet these targets are:

To optimize seedling culture technologies for *Kappaphycus* spp. and *Eucheuma denticulatum*. The project will develop strains that would have higher growth rates and climate change resilient varieties. To genetically assess, screen, and optimize production of high quality seedstocks of *Kappaphycus* spp. and *Eucheuma denticulatum* for a sustainable seaweed industry across the Sulu Archipelago (BARMM). For this purpose, the project will establish seaweed nurseries in Lato-Lato in Bongao, Panglima Sugala, Sitangkai and Sibutu. These nurseries would require power and water. To optimize postharvest handling practices and improve the quality of raw dried *Kappaphycus* spp. and *Eucheuma denticulatum* in the BARMM. The program started in Feb 2020 and will end in Feb 2023. It will be training 50 farmers on best seaweed health and farm management practices--in at least 6 municipalities-Sitangkai, Sibutu, panglima Sugala, South Ubian, Tandubas and Sapa-Sapa. It will also distribute 5 tons of high quality *Kappaphycus* cultivars (fast growing, resistant to ice-ice disease and high carrageenan yield and quality).

Table 13. Summary of synergies and duplications with other projects

Project/programme	Synergies	Duplications
Mindanao Water Supply Program of MinDA (MinDA Water) / BARMM Water project – implemented by MinDA	Demonstration of viability of small-scale desalination in water supply of the islands and productive use of water supply to increase economic and social security of the islands.	Currently the program does not include any activities in the project area due to shortages in government funding.

<i>and BARMM government with national funds</i>	Lessons learned from the project will be shared through the BARMM agencies involvement in the project (potential engagement of BARMM as an executing entity).	
Renewable Energy Technology to Increase Value-Added of Seaweeds in Tawi-Tawi (RETS) – <i>implemented by UNIDO and MinDA, funded by the European Union</i>	The infrastructure deployed by the RETS project will be partially utilized for powering the water supply infrastructure of the adaptation project. Water feasibility study provides a baseline for the proposed AF project. The project builds on experiences of successful implementation of the RETS project.	Duplications have been avoided at the concept design stage.
Integration of Productive Uses of Renewable Energy for Inclusive and Sustainable Energization in Mindanao or (I-PURE) – <i>implemented by MinDA, funded by the European Union</i>	Project's capacity building activities will include assets and knowledge products developed by the I-PURE project. MinDA, as executing partner, will ensure lessons learned through I-PURE are used for the execution of the adaptation project.	I-PURE project focuses on productive use of electricity in the communities. There is no duplication.
Establishment of the Seaweed Research and Establishment of Seaweed Research and Development Center (SeaRDeC) – <i>implemented by MSU-TCTO with national funds</i>	The project will utilize knowledge products developed by seaweed research and development center in MSU-TCTO. Also, cooperation with seaweed nurseries developed by the SeaRDeC project will be established. MSU-TCTO will be involved in the activities under Component 2 of the project.	No duplications identified as SeaRDeC project is targeting seaweed production techniques, knowledge and trainings.

## G. Learning and knowledge management

*If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.*

This project seeks to test the effectiveness of the proposed technology in a specific island setting and addressing the outlined challenges due to climate change. Project results are also vitally important for further roll-out to other sites in the region and the country. It is therefore critical that the process is fully documented, to provide guidelines and instructions for further implementation and scaling up in the Philippines.

Knowledge management is inherent to UNIDO's operating modality by sharing experiences across its interventions worldwide. This has been demonstrated through many high-quality publications, organization of events, webinars, and more. The establishment of and/or support to regional expert centres is one of the key elements to secure technology transfer, strengthen regional and global exchange and for locally building human capital and institutions. Examples are UNIDO's support for National Cleaner Production Centres, Small Hydropower Development (China), various Centres for Renewable Energy and Energy Efficiency, and others.

In the proposed project, a set of knowledge management activities is envisaged with the objective to define a solid exit strategy, facilitate the flow of information and knowledge to national and international stakeholders and beneficiaries, as well as to recollect experiences from the Philippines during and after the project. These will be key for scaling up activities for the project.

Moreover, a 'Knowledge Management Strategy' in line with the requirements of Knowledge Management of the Adaptation Fund will be designed and implemented under the proposed project, which will function as the basis for gathering and distributing all data, information and lessons learnt generated during the implementation of the project. The strategy will be based on the principles of synergy, transparency, participation and inclusion, flexibility, relevance and cost-effectiveness, as outlined in the Project-level Results Framework and Baseline Guidance of the Adaptation Fund<sup>62</sup>.

As a first step, the strategy will foresee a local, regional and international stocktaking of available and relevant information, paying particular attention to the networks of the stakeholders involved. The strategy will also include the development of a knowledge management system and a website and associated platform with information accessible by the public including

<sup>62</sup> <https://www.adaptation-fund.org/wp-content/uploads/2015/01/Results%20Framework%20and%20Baseline%20Guidance%20final%20compressed.pdf>

direct project stakeholders.

The planned dissemination activities include study tours, site visits, media releases and publications planned. Additionally training modules will be developed and made available to all interested parties in the country.

Moreover, all knowledge management activities will be gender responsive and try to accelerate learning on the implementation of gender-responsive adaptation actions and to contribute to addressing existing knowledge, data and institutional capacity gaps.

## H. Consultative process

*Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.*

The design of the project is a result of broad consultations with stakeholders at various levels done during:

- a) the implementation of the RETS project for a water feasibility study (2020 – 2021),
- b) the process of project concept development (2021),
- c) the process of project proposal and Environmental and Social Impact Assessment development (2022 – 2023).

The consultative process was supported by the RETS project with some activities done jointly (e.g. consultations for the project done during the RETS project steering committee meetings).

Local communities have been engaged directly in the field water survey conducted by the RETS project in 2019/2020, which covered 11 BLGUs (Barangay Local Government Unit - basic settlement units – villages). Leaders of those communities were surveyed in the field in the context of their current water supply status, their needs, and expectations. These results were used in the design of the concept – as the main need for sustainable water supply in the islands has been identified as a main concern of the communities. The RETS project did not address those issues. Based on the results of the survey, the water feasibility study has been conducted (finalized in June 2022), which provided key inputs into the project design.

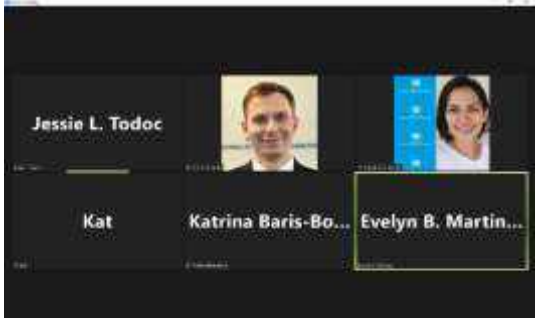
During the following project concept preparation stage local government units – leaders of the communities (both women and men) have been consulted, these include 2 LGUs: Sibutu and Sitangkai. Also, the following consultations were conducted (due to restrictions on travel all meetings were either in online format or through phone when internet connection was not satisfactory).

**Table 14. List of stakeholder consultations for the preparation of the project concept.**

Date	Scope and outcome of consultation	Stakeholders consulted
2019/2020	Field survey of water supply in Sitangkai and Sibutu (within the RETS project). 7 barangays inspected in Sibutu and 4 in Sitangkai (covering ca. 50% of the local population). <u>Outcome:</u> it has been found that most systems have no treatment facility, there are limited numbers of communal faucets, supply of water is intermittent, and some wells are not working due to inadequate funds for operation and maintenance. Improvement of water system has been indicated as main issue.	Local communities and community representatives at Barangays: Tongmageng, Tonggusong, North Larap, South Larap, Mokhtar Sulayman, Tongsibalo, Ligayan, Sheik Makdum, Taungoh, Tongehat, Ungus-Ungus
8/06/2021	Presentation of the project idea note based on the needs identified during the implementation of the RETS project, discussion on the possible cooperation. <u>Outcome:</u> Based on the analysis of the current water supply infrastructure and its impact on resilience and livelihoods a decision was formed to prepare project concept for AF funding.	Mindanao Development Authority
17/07/2021	Follow-up consultation on the project concept – detailed discussion on the project rationale and scope. <u>Outcome:</u> further refinement of the project concept scope based on MinDA's development projects experience in Tawi-Tawi	Mindanao Development Authority
17/07/2021	Discussion of the project relevance to the selected project area based on MSU experience in the proposed project area <u>Outcome:</u> gender issues in seaweed farming raised and discussed; discussion on MSU project (SeaRDeC) and possible synergies/duplications; further refinement of the project concept scope	Mindanao State University Tawi-Tawi College of Technology and Oceanography

30/07/2021	<p>Discussion of the project idea – initial endorsement for the project idea. Guidance for further project development from the CCC.</p> <p><u>Outcome:</u> suggestions to the project concept scope and initial endorsement (confirmed adaptation needs in the area)</p>	Climate Change Commission of the Philippines
25/08/2021	<p>1<sup>st</sup> Technical Working Group (TWG) meeting:</p> <ul style="list-style-type: none"> <li>- Setting up the TWG,</li> <li>- Presentation of the project idea and Adaptation Fund requirements,</li> <li>- Discussion on the project concept (see Annex I for detailed notes)</li> </ul> <p><u>Outcome:</u> identification of critical issues in the area in water supply, climate impacts and main social and economic sustainability issues; suggestions to the project concept scope and initial endorsement by TWG (please refer to detailed minutes in the annex)</p> 	<p>Mindanao Development Authority, Department of Energy (DOE), Department of Environment and Natural Resources (DENR), Climate Change Commission (CCC), Department of Science and Technology (DOST), PLGU of Tawi-Tawi, Mindanao State University Tawi-Tawi, Ministry of Agriculture, Fisheries and Agrarian Reform – BARMM, Ministry of Environment, Natural Resources and Energy – BARMM, UNIDO (see Annex I for detailed list of participants)</p>
3/09/2021	<p>Discussion on water supply situation in Sibutu</p> <p><u>Outcome:</u> confirmation of the existing needs in water supply, related gender issues and climate impacts in the area, expressed support to the proposed project concept</p>	Sibutu Local Government Unit
1/10/2021	<p>2<sup>nd</sup> TWG meeting:</p> <ul style="list-style-type: none"> <li>- presentation of the project concept for the Adaptation Fund</li> <li>- discussion on the project concept (see Annex I for detailed notes)</li> </ul>  <p><u>Outcome:</u> further suggestions to the project concept scope and endorsement by TWG (please refer to detailed minutes in the annex)</p>	<p>CCC, DENR, DOE, DOST, MSU-TCTO, BARMM – MAFAR, BARMM – MOST, BARMM – MENRE, PLGU of Tawi-Tawi, MinDA, UNIDO (see Annex I for detailed list of participants)</p>



1 – 14/10/2021	Draft Project Concept document shared for review and comments with TWG members. <u>Outcome:</u> small modifications of the project concept document	CCC, DENR, DOE, DOST, MSU-TCTO, BARMM – MAFAR, BARMM – MOST, BARMM – MENRE, PLGU of Tawi-Tawi, MinDA
7/10/2021	Situation and conditions of seaweeds farmers in Sitangkai and Sibutu <u>Outcome:</u> confirmation of the importance of water for the area and seaweed processing, confirmed importance of fresh water supply in seaweed value chain; mentioned importance of gender issues with water supply, expressed support to the proposed project concept	Tawi-Tawi Provincial office of BARMM - MAFAR
18/10/2021		

The consultations have been conducted in a gender-responsive manner and during the consultations gender issues have been considered as well as environmental and social issues, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.



Additionally, during the work on project concept key inputs to the design of the project were provided by:

- MINDA staff, which similarly provided key inputs and comments, particularly as regards the MINDA Water Supply Program, which is presented in this report. MINDA also provided other general reference documents on BARMM and Mindanao.
- Dr. Zayda Halun of the MSU-TCTO, a member of the TWG, provided key inputs and comments to the project concept. MSU-TCTO's research outputs and publications on climate adaptation and seaweed farming in Tawi-Tawi have been key resources to this draft project concept.



The project concept has been endorsed by the Adaptation Fund Board during the 29<sup>th</sup> meeting (5-6 April 2022). During the full project proposal development phase, a number of follow-up consultative activities were undertaken with stakeholders at various levels, with primary focus on the target communities and gender issues at the selected sites. The process aimed at ensuring that all stakeholders are adequately consulted, and their views taken into account in project design. The list of stakeholder consultations during the full project proposal development phase is given in Table 12.

**Table 15. List of stakeholder consultations for the preparation of the full project proposal.**

Date	Scope and outcome of consultation	Stakeholders consulted
16/12/2021	Comments received on the project concept. <u>Outcome:</u> the project has been found relevant and in line with Philippine priorities, directly contributing to the key priorities and expected outcomes of the NCCAP namely Food Security (FS), Water Sufficiency (WS), Ecological and Environmental Stability (EES), Sustainable Energy (SE) and Knowledge and Capacity Development (KCD). Suggestions for further strengthening of the proposal have been provided.	Climate Change Commission

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">02 – 03/2022</p>	<p>For the development of the Assessment and Preliminary Design Options for Feasible Renewable Energy-Water Supply Systems in Sibutu and Sitangkai Islands, the team of appointed consultants carried out a field study with a community survey. The survey was divided into four sections: (1) household information, (2) water supply, (3) sanitation and hygiene, and (4) electricity supply. For the sample survey please refer to the consultation report (Annex B).</p> <p>The survey was supported with interviews with representatives of the local communities and focused on identification of issues with water availability. It also focused on gender issues, through interviews with women from the communities.</p> <p>Findings have been included into the gender analysis and water study.</p>  <p><u>Outcome:</u> based on the responses from the survey and interviews key issues in water supply and sanitation were identified (including actual water demand), which allowed for improved project design, reflecting actual needs and problems of the communities. As one of the results it was recommended to modify the design of the water system and include sanitation in the project scope.</p>	<p>Local communities:</p> <ul style="list-style-type: none"> <li>- Sibutu – surveyed 925 out of 3911 households</li> <li>- Sitangkai – surveyed 808 out of 5330 households.</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">9/08/2022</p>	<p>The project design has been discussed with a focus on potential budget increase due to increase in the project scope, based on the field studies and actual needs of the communities. Issues of indigenous people and environmental impact of the project have been raised. The possibility of expansion of the project to other areas was also discussed. Additionally solid waste management was also mentioned as one of the areas which potentially the project should also investigate.</p>  <p><u>Outcome:</u> the project received endorsement from both the DENR and CCC and approval of the increased project budget. Suggestions from both government agencies have been taken into consideration in the development of the terms of reference for the ESIA.</p>	<ul style="list-style-type: none"> <li>- DA for the AF Usec. A. Rebueta-Teh with DENR team</li> <li>- Commissioner and Vice Chair of the Philippines' Climate Change Commission Robert Borje, with CCC team</li> </ul>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">11/08/2022</p>	<p>During the consultation meeting (held after the RETS Project Steering Committee) updated project design based on the results of field study was presented. LGUs and PLGU provided their comments on the proposed scope of the project intervention, expressing their needs and concerns regarding the desalination facility (if it is going to impact seaweed farming by brine discharge, its feasibility compared to deep wells). Specially gender issues were raised, to be addressed by the project (within the communities men are not allowed to fetch water - only women and children deliver water). Additionally, the issue of proper solid waste management was raised as one of the priorities for the project.</p>  <p><b>Outcome:</b> updated project design has been approved by the representatives of the local communities and provincial government. Suggestions have been used to guide the ESIA and Gender Assessment for the project.</p>	<p>MinDA, Sitangkai and Sibutu LGU representatives, PLGU Tawi-Tawi, BARMM – MENRE</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">12/2022</p>	<p>Consultation for the ESIA – field trip to the project site and series of online/face-to-face meetings, December 5-16, 2022. The primary purpose of conducting the stakeholder consultation was to encourage the participation of important stakeholders and local people in the process of the project implementation and to integrate the appropriate environmental and social concerns into the process, to ensure that whatever negative impacts the project may cause, these will be identified and mitigated early on, especially as regards to environmental and social safeguards.</p> <p>Initial meetings, key informant interviews (KIIs), focus group discussions (FGDs), including women groups, Environmental Impact Assessment- Socio-economic Perception (EIA-SEP) household surveys, and consultations were held with the community and other stakeholder vis-a-vis local government officials, concerned regional government agencies officials, and community influentials. During the meeting, the project objectives were explained and elaborated. The stakeholders' concerns and suggestions were also documented and taken care of to further enhance the project's acceptability on environmental and social grounds. During the field visits, a series of consultations were carried out at various locations in the project areas, wherever convenient and comfortable with the stakeholders.</p>  <p><b>Outcome:</b> the consultation process led to changes in the project design to respond to local expectations. Detailed consultation report is presented in Annex B.</p>	<p>Local communities, Sitangkai and Sibutu LGU representatives, BARMM - MENRE</p>

11/01/2023	<p>Consultation of the project implementation arrangements and project budget. Discussion of the initial ESIA results.</p> <p><u>Outcome:</u> Agreed implementation structure and budget. Further guidance to the ESIA team provided.</p>	Mindanao Development Authority
14/02/2023	<p>The project has been discussed with current scope, budget, and implementation arrangements.</p>  <p><u>Outcome:</u> There were no specific comments from OFP or CCC to the project design.</p>	<ul style="list-style-type: none"> <li>- DA for the AF Usec. A. Rebuelta-Teh with DENR team</li> <li>- CCC team</li> </ul>
17/02/2023	<p>During the consultation meeting detailed project design and results of the environmental and social impact assessment have been presented and discussed. Meeting participants provided their comments to the proposed activities expressing their needs and concerns, including:</p> <ul style="list-style-type: none"> <li>- Need for permits for the utilization of water (from DENR).</li> <li>- Setting up and management of water districts, with a primary role of LGUs in the utilities, their sustainability and prices of water provided and communities' willingness and ability to pay for the water.</li> <li>- Issues of land acquisition for the desalination plant and PV installation.</li> <li>- Specific recommendations to the desalination plant technology, discharge of brine and utilization of by-products.</li> <li>- Recommendations for scaling up of the project.</li> </ul>  <p><u>Outcome:</u> key recommendations regarding environmental issues have been included in the ESIA. Recommendations for project sustainability have been included in the project design (water districts) including digital solutions for payment collection. Technical recommendations will be used as guidelines for the development of the TORs during project implementation phase.</p>	MinDA, Sitangkai and Sibutu LGU representatives, PLGU Tawi-Tawi, BARMM – MENRE, BARMM – MAFAR, DENR, DOE,



<p style="writing-mode: vertical-rl; transform: rotate(180deg);">13 – 15/03/2023</p>	<p>Opportunities for collaboration with BARMM - MAFAR for the project execution have been discussed. BARMM government-led activities in the area have been discussed, with focus on water supply.</p>  <p><u>Outcome:</u> BARMM ministries (MAFAR, MENRE) have been identified as potential co-executing partners for the project and included in the project document.</p>	<p>BARMM - MAFAR BARMM - MENRE</p>
	<p>During the meeting with PLGU Tawi-Tawi the project was discussed and provincial government priorities. The DENR team had the opportunity to walk around the community where issues on solid waste, water supply, and sanitation facilities are evident. The DENR team provided recommendations for the project to address the urgent needs of the communities. In particular, including sanitation and an overall long-term development roadmap for the islands. FinTech Support to the community on their seaweed farming and how to digitalize their B2B transactions was also mentioned.</p>  <p><u>Outcome:</u> the project has been endorsed by the DENR officials, provincial and local governments, and key recommendations have been included in the project design.</p>	<p>Field trip to Tawi-Tawi and project site with DENR officials (USec Analiza Teh, USec Jonas Leones), and FASPS Director Al Orolfo and Ms. Eda Soriano.</p> <p>PLGU Tawi-Tawi, Sibutu and Sitangkai LGUs.</p>

Furthermore, comprehensive community level consultations at the targeted sites will be undertaken at the inception phase of the project prior to roll-out of the project activities. Additionally, during the inception phase a targeted effort will be made to include key stakeholders that bring a gender perspective and broad gender expertise, such as representatives from specialist government ministries for women and youth and gender equality agencies, women’s networks and women’s rights and gender diverse advocacy organizations from civil society or academia on the national and local level. At local level women’s cooperatives and community-based organizations, which are often run by women and target services to women and their families will be included.

### I. Justification for funding requested

*Provide justification for funding requested, focusing on the full cost of adaptation reasoning.*

Currently, the demand for water in Sitangkai and Sibutu is underserved by the communal water delivery system. Existing



service provision is inefficient, too costly for the communities and is becoming unreliable due to climate change. Therefore, reliable technologies coupled with public subsidies are necessary to provide reliable, resilient water access.

In the absence of the project the communities in Sitangkai and Sibutu would be served by unreliable water system based on ground water (Sibutu) and water harvesting (Sitangkai), which would become more and more affected by the climate change leading to lower availability of freshwater. In turn the communities would need to import bottled water from other islands in the province, leading to continuously increasing cost of water for the society. This would limit the use of water for productive purposes (seaweeds processing) and decrease value of the final product. All these factors would eventually lead to worsening living conditions (health, hygiene) and impacting the economic status of the seaweed farming communities.

Desalination is among the most expensive methods of water delivery (because of high CAPEX and electricity cost share in the final price of produced water), therefore small LGUs in Tawi-Tawi cannot provide enough funding for the project, while the government programmes in the area do not include Sibutu and Sitangkai. On the other hand, the market is too small to attract private investment without subsidies. The low economic potential of the islands in Tawi-Tawi, and relatively low consumption water, the price of commercially produced water would not be feasible for the communities, resulting in even lower water consumption. Therefore, the most viable solution is a grant funding covering the full cost of water system deployment and upgrading in the islands, which is the full cost of adaptation to climate change.

The grant funding provided by the Adaptation Fund will be utilized to cover the cost of adaptation of the Sitangkai and Sibutu communities to climate change.

**Table 16. Justification for funding**

With Adaptation Fund Grant	Without Adaptation Fund Grant
Critical infrastructure (desalination plant, water distribution network, PV power supply for the water system), needed to ensure safe, affordable, climate-resilient drinking water supply will be deployed and upgraded	No currently available funding to deploy and upgrade infrastructure will leave fast-growing population of 71,000 people without affordable, reliable drinking water access, impacting most vulnerable groups (women and youth).
Viable solutions for rainwater harvesting and sanitation, which will directly increase adaptive capacity of the local communities and their resilience will be demonstrated	Rudimentary rainwater harvesting systems and no proper sanitation systems will be used, which are unsafe to local population due to health concerns and possible water contamination.
Capacity of local government units to maintain and operate deployed infrastructure for the maximum benefit of the community will be built.	Currently the local governments do not have capacity, knowledge and resources to establish water districts, which would ensure proper infrastructure management and water distribution in the area.
Livelihoods of seaweed farmers will be transformed by building their capacity to adapt to changing climate and increase their productivity and value-added processing.	Seaweed farmers will rely on current practices, which are increasingly affected by climate change (“ice-ice” disease) and production of low value RDS
Community awareness of climate change and adaptation strategies will be built	The community awareness will remain low.
Knowledge on adaptation strategies for seaweed farming communities and project lessons learnt will be shared across the country	Other communities in the Philippines will not benefit from new available solutions and adaptation strategies.
Project scale up concept will be developed	No similar projects will be developed.

The outcomes of the RETS project (baseline project) will be achieved prior to the start of the proposed AF project. Hence there is no anticipated risk for realizing the proposed activities under the project submitted for AF funding. The AF project will rather build upon the strong results and lessons learnt during the implementation of the RETS project.

## **J. Sustainability of the project outcomes**

*Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.*

The project will develop infrastructure to provide the necessary adaptive access to water and its associated direct benefits. The non-infrastructure components of the project are also specifically geared to provide increased knowledge and skills to increase resiliency at all levels of the project interaction. The project has been designed with sustainability of the outcomes in mind. The proposed investment component will be accompanied by components with soft activities focused on building ownership and management of the infrastructure, assuring proper maintenance and use of the deployed systems.

The project is designed in sustainability in a wider scale - planned activities in the scaling up component will additionally increase the sustainability of the intervention through replication and scaling up with other funds (i.e. Green Climate Fund) and/or private sector.

During the project design phase based on other relevant project experiences, dedicated field study and broad stakeholder consultations (engagement of seaweed communities incl. women and youth), it was identified that the main long-term project sustainability factor is related to institutional capacity for operation and maintenance of the infrastructure.

### **Institutional sustainability**

The project is fully compliant with Philippine policy framework and follows guidelines of the Philippine Development Plan and National Disaster Risk Reduction and Management Plan. It directly implements Philippine Water Supply Sector Roadmap in the area and principles of Philippine Action Plan for Sustainable Consumption and Production. The project builds on institutional framework which is already in place (local government units are responsible for water supply of the communities). Institutional sustainability will be addressed by the project through establishment of water districts on both islands. These will be set-up in line with the Local Water Utilities Administration of the Philippines regulations. A water district is a local corporate entity that operates and maintains a water supply system in one or more municipalities. It is classified as a government-owned and controlled corporation and is run by a five-man Board of Directors through a General Manager. Through Component 2 of the project the project will support Sitangkai and Sibutu LGUs in establishing the water districts, by providing organizational, technical and advisory support. This will include building relevant capacities of municipal staff, developing operational guidelines, business plans and other relevant documents and procedures. Additionally, equipment needed for the proper operation of the water districts will be provided through the project. The water districts will guarantee the sustainability of the water supply systems, as they will oversee water quality management, proper operation, and maintenance of the infrastructure.

Knowledge management (Component 4) will also strengthen the sustainability of the project outcomes, allowing for easy scaling up of the interventions. Relevant stakeholders at the regional (BARMM, MinDA) and national level (government) will be involved in the project to ensure sustainability and replicability of its outcomes.

Through the provision of execution support to MinDA, the institutional capacity of MinDA for project execution will be built and strengthened, which will contribute to institutional sustainability of the project.

### **Economic and social sustainability**

To ensure economic and social sustainability of the deployed water infrastructure, the project will include:

- a) Formation of a water districts - the possibility of public-private partnership will be explored to come up with the contractual arrangement that is the most sustainable for the case of the two islands (ensuring the ownership of the grant-funded infrastructure is kept in public domain). The water districts will ensure proper financial management of the water supply system. Formation of this unit will include consultation with barangays. This will contribute to acceptance and participation of local communities and hence support sustainability.
- b) Equitable tariff for water services - currently the price of imported potable water reaches 5 USD/m<sup>3</sup>, while average market cost of water from small desalination plants is at about 1.25 USD/m<sup>3</sup>. Although the initial investment is from a grant, the tariff will be designed to be able to cover for the proper management, and operation and maintenance of the water infrastructure system, provide funds for the system scale-up to meet the projected demand for water and provide funding for further expansion of sanitation system in the islands. Initial estimates from the water feasibility study give a price of PHP 1.00 per liter of water. Willingness to pay of the communities has been verified during the consultation process.
- c) Cashless operation – this is required, due to foreseen large financial transfers during systems operation, and initial daily/weekly payments for water service. The communities are already using cashless payments (e.g. GCash) on a large scale for online shopping. A daily turnover for the water districts is estimated at 1 million PHP, and electronic payments will ensure proper operations of the system. Additional support is required to establish reliable internet access in the area for the electronic payments, which is targeted by Component 2.

Equally important for the economic and social sustainability of the project is to ensure that the communities will have additional disposable income to pay for the provided water services. This will be addressed by the project through Component 3 which focuses on seaweed industry development in Sibutu and Sitangkai, as this is identified as a main income source of the communities. Through the integration of improvements (technology, organisation, knowledge) in the seaweed value chain the project will stimulate and upgrade seaweed industry in the area, generating more income and stimulating job creation. Ultimately, this will help to ensure that communities have enough disposable income to support their ability to pay for water services.

Capacity building provided to the communities and LGUs and will enable them to fully benefit from the provided infrastructure and use it in a productive way to increase economic prosperity of the communities.

Improved water security of the communities and reduced cost of water supply compared to existing or conventional yet more

expensive technology which could be implemented, are strong economic and social motivations for economic and social sustainability deployed technology. In addition, promotion of the system to the public through various media, such as articles in the media and magazines, will help to bring popular support for wider application in the region.

### Environmental sustainability

The proposed project brings development with a significantly reduced carbon footprint, using renewable energy for powering the water system (desalination plants), meeting climate (SDG 13) and development goals (SDG 6). Also, other environmental factors of desalination technology were analyzed and relevant mitigation measures proposed through the Environmental Impact Assessment and ESMP, to ensure that environmental damage is prevented.

## K. Overview of the environmental and social impacts and risks

*Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme*

The project has undergone environmental and social risk (E&S) assessments in line with Adaptation Fund's Environmental and Social (E&S) Policy and Gender Policy, the UNIDO Gender Policy and the UNIDO Environmental and Social Safeguards Policy and Procedures. As a result, the project has been classified as a category B project. The proposed project is likely to have small impacts on human populations or environmentally important areas. Likely impacts will be few in number, site-specific, and few if any will be irreversible. As per the AF policy an Environmental Social Impact Assessment (ESIA) will be developed which will inform the Environmental and Social Management Plan (ESMP) prepared for the project. The initial screening of risks against AF 15 principles is presented in the table below.

**Table 17. Overview of the environmental and social impacts and risks**

E&S principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	The project is fully compliant with relevant national Philippine regulations. All contractors will be required to comply with existing national standards and building codes as described in section E. of the concept, as well as UNIDO Environmental and Social Safeguards. Relevant clauses will be included in contract agreements. All activities will follow guidance from the EISA and the ESMP.	<b>NONE</b>
Access and Equity		<p style="text-align: center;"><b>LOW</b></p> <p>The deployed infrastructure will be owned and operated by the Local Government Units, ensuring that all members of the communities will be able to access the deployed infrastructure. This approach was confirmed through the stakeholder engagement process during the project preparatory stage (Water feasibility study).</p>
Marginalized and Vulnerable Groups		<p style="text-align: center;"><b>LOW</b></p> <p>The project activities may have potential impact (positive and/or negative) on marginalized and vulnerable groups. As such, further assessments and related consultations have been carried out during the project preparatory stage. An ESIA and ESMP has been developed for this project. The ESIA assesses potential impacts on marginalized groups and vulnerable groups and informs ESMP development.</p> <p>Additionally, a project-level grievance mechanism will be established and will remain accessible to all project stakeholders and effected vulnerable groups.</p>

Human Rights		<p style="text-align: center;"><b>LOW</b></p> <p>The project through provision of water access may have positive impacts in enhancing the basic rights of some of the marginalized groups (minorities) in the project area.</p> <p>The specific potential risks and related mitigation measures have been assessed in the ESIA and included in the environmental and social management plan (ESMP) for this project.</p>
Gender Equality and Women's Empowerment		<p style="text-align: center;"><b>LOW</b></p> <p>The project will target to have positive impact on GEEW, a detailed Gender Analysis will be developed at the fully developed project proposal stage.</p> <p>Women in seaweed farming communities will be targeted by specific activities (capacity building, direct support) and gender sensitive indicators to monitor and ensure equal access to water for women and men will be developed in the project proposal stage.</p> <p>A Gender Analysis and Action plan has been prepared for the project.</p>
Core Labour Rights		<p style="text-align: center;"><b>LOW</b></p> <p>The project will ensure full compliance with the national labour act and the related regulations. Additionally, given the project's value-addition and processing of seaweed activities and the related equipment installation and deployment, standard operational health and safety (OHS) procedures will be introduced and followed throughout the project implementation. The specific potential risks and related mitigation measures have been assessed in the ESIA and in the environmental and social management plan (ESMP) for this project.</p>
Indigenous Peoples		<p style="text-align: center;"><b>LOW/MEDIUM</b></p> <p>The ESMP will assess and confirm on the presence of indigenous peoples (IPs) in the project areas. The ESMP will further analyze any potential impacts on IPs and define specific actions to respect, conserve and maintain the knowledge, innovations and practices of indigenous and local communities, as well as to protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.</p> <p>Should the presence of IPs be identified, all the above actions will be carried out through a Free, Prior and Informed Consent (FPIC) process to: (a) ensure a positive engagement of IPs in the project activities; (b) avoid adverse impacts, or when avoidance is not possible, minimize, or compensate for such effects; (c) tailor benefits in a culturally appropriate way. Based on the outcomes of the FPIC consultative process, the project team will consider whether there is a need to develop an Indigenous Peoples Plan (IPP), in accordance with UNIDO ESSPP.</p>
Involuntary Resettlement		<p style="text-align: center;"><b>LOW</b></p> <p>The project activities should not require any resettlement either voluntary or involuntary. This issue has been assessed in the ESIA which informs the environmental and social management plan (ESMP) for this project.</p>
Protection of Natural Habitats		<p style="text-align: center;"><b>MEDIUM</b></p> <p>Seaweed farming may potentially impact natural ocean habitats (including coral reefs and mangroves and its role for fish populations); therefore, potential risks on these habitats have been analyzed in the ESIA and related mitigation actions have been proposed in the ESMP .</p>

Conservation of Biological Diversity		<b>MEDIUM</b> Seaweed farming may potentially impact biological diversity; therefore, the potential risks and related mitigation measures have been analyzed as part of the ESIA and ESMP development.
Climate Change		<b>LOW</b> The project is proposed to increase the adaptive capacity of the communities in the selected areas to the effect of climate change which is affecting water quality and reducing water supply. Due to identified climate hazards a potential impact on infrastructure and services of heatwaves have been analyzed as part of the ESIA and ESMP development. The project components will not introduce GHG in the atmosphere to contribute to the climate change, but rather use renewable energy which is a mitigation measure to climate change.
Pollution Prevention and Resource Efficiency		<b>MEDIUM</b> The project will provide clean and resource-efficient solutions (renewable energy, use of seawater) in the project area; however, two potential issues have been identified: 1) Desalination plants discharge brine, its impact on ecosystem have been analyzed and specific management plan prepared (ESMP). 2) Fertilizer in the seaweed farming could negatively affect the quality of seaweeds and the water quality around the farm where they dispose the fertilizer solution in the long term. Further research is needed to investigate the effects of fertilizer use on seaweed production. This will be done during the project implementation (component 2) The identified risks and related mitigation measures have been analyzed through an ESIA which informs the ESMP for this project.
Public Health		<b>LOW/MEDIUM</b> The project will target to have positive impact on public health through provision of fresh water, which will positively impact hygiene in the communities. Potential risks from project activities on the community health, safety and security from the perspective of COVID-19 pandemic have been duly considered as part of the ESIA and ESMP.
Physical and Cultural Heritage	The project activities will not pose any threat to physical and cultural heritage.	<b>NONE</b>
Lands and Soil Conservation		<b>LOW</b> An ESIA and ESMP have been developed for this project in detail for the identified risks.



## PART III: IMPLEMENTATION ARRANGEMENTS

### A. Arrangements for project implementation

The **Implementing Entity for the project is UNIDO**, as an accredited entity to the Adaptation Fund. The endorsement letter, provided by the country's NDA has identified MinDA as an executing entity for the project and requested UNIDO for co-execution support. The rationale for this decision is based on the experience and successful setup of the Renewable Energy Technology to Increase Value-Added of Seaweeds in Tawi-Tawi (RETS) project implemented by UNIDO and co-executed by UNIDO and MinDA in the same area.

Currently there are no entities in the Philippines that have capacity and experience with executing AF projects in the target area. MinDA, as a government agency, would need to follow complicated finance flow and procurement procedures, which could impact timely project execution. Also, as indicated by MinDA in the consultation process, its technical capacity to fully execute the project is limited, due to other tasks. BARMM ministries (MENRE, MAFAR, MILG) were identified during project consultation as potential co-executing partners for the project, possessing relevant experience with water supply projects (including desalination facilities). The scope of BARMM engagement in the project will be determined during the inception phase of the project and sanctioned by the Project Steering Committee.

With the **co-execution modality** UNIDO would provide execution support with its procurement and recruitment services to execute investment and community development activities. MinDA would oversee execution of the project execute knowledge dissemination and consultation activities for which it is better positioned in the region. With the co-execution modality UNIDO would build MinDA's capacity (through knowledge exchange and support provided MinDA on case-by-case basis for the execution of project activities) to ensure the successful execution of the potential future AF projects, based on the challenges which were identified during the RETS project implementation. Additionally, the Tawi-Tawi Province is an area with specific restrictions for access due to security concerns, complicating project execution. UNIDO already has experience and knowledge of local conditions and sensitivities. To ensure clear separation of implementing and executing functions and responsibilities, UNIDO as implementing and co-executing entity will maintain the following structure for the project:

- Implementation functions (monitoring and evaluation, supervision and reporting) will be handled by a Project Manager, reporting to the Chief of the Energy Systems and Decarbonization Unit (within the responsibility of the Director of the Division of Decarbonization and Sustainable Energy, Directorate of Technical Cooperation And Sustainable Industrial Development).
- Execution functions will be handled by a Project Management Unit (led by a national expert), based in the UNIDO Field Office in the Philippines, reporting to UNIDO Country Representative (within the responsibility of the Director of Regional and Field Offices Division).

**Additional project partners** will be engaged for successful project execution. Local governments (Local Government of Sitangkai, Local Government of Sibutu) will actively support execution of the project activities and will benefit from the results of the project. Additionally, Provincial Government of Tawi-Tawi and Mindanao State University - Tawi-Tawi College of Technology and Oceanography will be involved as key project stakeholders.

**Table 18. Roles of key project partners in project execution.**

Entity	Role
MinDA	<ul style="list-style-type: none"> <li>- Executing entity</li> <li>- Chair of the Project Steering Committee</li> <li>- Partial execution of component 4 of the project</li> <li>- Partial execution of component 5 of the project</li> </ul>
UNIDO	<ul style="list-style-type: none"> <li>- Implementing entity,</li> <li>- Co-executing entity,</li> <li>- Hosting Project Management Unit,</li> <li>- Full execution of component 3 of the project,</li> <li>- Co-execution of components 1, 2, 4 and 5 of the project</li> <li>- Provision of procurement services for the project execution.</li> </ul>
BARMM Government (MILG, MENRE, MAFAR)	<ul style="list-style-type: none"> <li>- Potential co-executing partner for project activities (components 1 – 5),</li> <li>- Support in capacity building activities and knowledge dissemination.</li> </ul>
Local Government of Sitangkai	<ul style="list-style-type: none"> <li>- Provision of land for the desalination system and PV system extension</li> <li>- Support in organizing civil works (building of desalination plant, PV system extension and water distribution system)</li> </ul>

	<ul style="list-style-type: none"> <li>- Support in capacity building activities</li> <li>- Setting up water districts and water management board.</li> </ul>
Local Government of Sibutu	<ul style="list-style-type: none"> <li>- Provision of land for the desalination system and PV system extension</li> <li>- Support in organizing civil works (upgrading of the water distribution system)</li> <li>- Support in capacity building activities</li> <li>- Setting up water districts and water management board.</li> </ul>
Provincial Government of Tawi-Tawi	<ul style="list-style-type: none"> <li>- Support in capacity building activities and knowledge dissemination</li> <li>- Supporting role in setting up water districts and water management board.</li> </ul>
MSU-TCTO	<ul style="list-style-type: none"> <li>- Supporting role in capacity building activities and knowledge dissemination (components 2 and 4)</li> </ul>

**A Project Steering Committee (PSC) will be set-up, chaired by MinDA.** It is proposed for the PSC to meet twice a year, after the project start. Members of the PSC (MinDA, BARMM government, Tawi-Tawi province, LGUs, youth representative e.g. from a youth group/ association, representative from a women’s group/ association) will nominate staff to participate in the PSC meetings and coordination with PEE on day-to-day basis. It will be fostered that women and men are equally represented in the PSC meetings and gender/ youth focal points from the main executing partners will be invited to participate and contribute.

Main PSC tasks and responsibilities will include:

- Biannual meetings,
- Advisory role to the Project Executing Entity
- Approvals of project budget and annual workplans,
- Decisions on the key project issues.

Each PSC meeting will be concluded with decisions taken and meeting minutes serving as guidance for project execution.

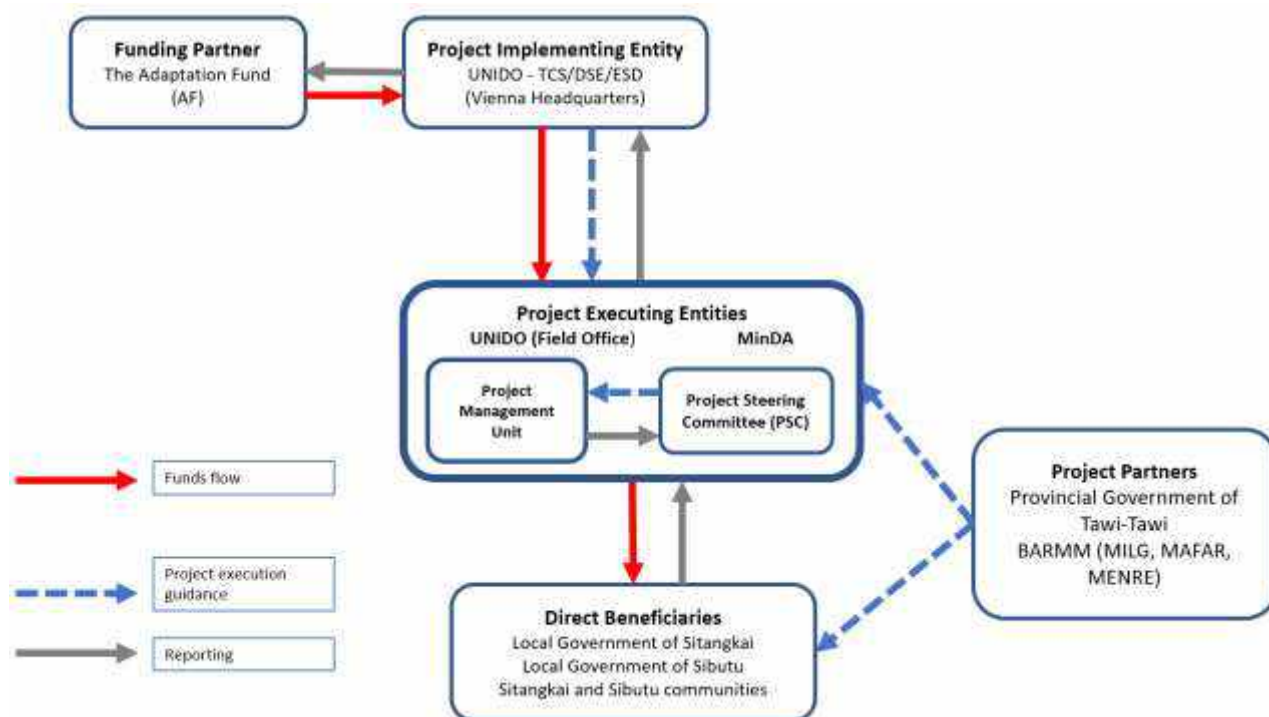


Figure 15. Proposed project implementation arrangements.

### Procurement

Main procurement activities within the project include high value procurement of equipment and services exceeding value of 200,000 EUR, including:

- Development of reverse-osmosis, modular, 1000 CMD desalination plant in Sitangkai (in Tongmageng), Tawi-Tawi,

Philippines

- Addition of 1 MWp PV capacity at Tongmageng hybrid power plant to power the desalination plant in Sitangkai (in Tongmageng), Tawi-Tawi, Philippines
- Rehabilitation and upgrading of existing level 2 water supply systems to level 3 in Sibutu Island, Tawi-Tawi, Philippines

Additionally, the project includes high value procurement of services and equipment in the value of 40,000 – 200,000 EUR and medium value procurement of services, according to UNIDO regulations. All procurement activities foreseen will be in line with UNIDO’s standard procurement modality of Open International Competition, following UNIDO’s rules, regulations and related-processes.

### Transfer of assets

Full or partial ownership of equipment/assets purchased under the project may be transferred to national counterparts and/or project beneficiaries during the project implementation as deemed appropriate by the government counterpart in consultation with the UNIDO Project Manager.

### Legal context

“The present project is governed by the provisions of the Standard Basic Cooperation Agreement between the Republic of Philippines and UNIDO, signed and entered into force on 26 February 1993.”

## B. Financial and project risk management

Table 19. Measures for financial and project risk management

Risks	Likelihood (1 – 3)	Impact (1 – 3)	Risk Level (L x I)	Mitigation Measures
<b>INSTITUTIONAL</b>				
Delayed project start due to lengthy procedures	2	2	4	This has been anticipated and included in the project design – project duration has been set to 4 years, which will allow to cover a delayed start in case it occurs.
Lack of or poor coordination between project partners	1	3	3	Project implementation and execution structure is based on successful setup of the RETS project. The project partners are the same as in the RETS project, lines of communication are already established, and partners know each other well.
Capacity constraints of executing entities, local institutions, communities and the private sector	2	2	4	UNIDO is experienced executing agency, with large portfolio of projects in the Philippines and the region, Country Office and relevant national project staff. Project implementation setup takes consideration of limited capacities of national partners – UNIDO will support project partners in building their capacity for successful development project execution.  Local communities and private sector have been engaged in consultation of the project and will be involved in project execution activities aiming at building their technical capacity for successful project delivery.
<b>FINANCIAL</b>				
Lack of financial and technical resources for proper maintenance of the water supply infrastructure	3	3	9	This has been considered a major risk and mitigation measures have been included in the project design – project component 2 focuses on building capacity of LGUs to maintain the infrastructure, through setting up water districts.
Higher cost of investment activities due to inflation and	3	2	6	Project budget has been adjusted to current prices. UNIDO procurement services will ensure open international competition which will result in the best price for the equipment. The budget

increased energy prices globally				has been planned to cover slight increase in the equipment prices.
Communities in the islands not willing to pay for the water (new tariff)	2	3	6	Willingness to pay has been initially analysed in the water feasibility studies (surveys in the project area) and during consultation process for the ESIA. It has been assessed that the expected tariff for water will be much less (up to 5 times less), than the current price water.
Financial mismanagement during the project implementation	1	3	3	UNIDO as an implementing and co-executing partner will be managing funds, with all relevant funds management procedures, internal and external audits it minimises the risk of funds mismanagement.
<b>POLITICAL</b>				
Lack of interest from local community in the seaweed farming capacity building	1	3	3	A stakeholder consultation process has been included in the project design process (at the concept and full project proposal stage), including representative steering committee, virtual meetings, direct consultation with local communities, local, regional, and national government representatives.  The project design reflects local and regional priorities and has been consulted with affected communities and government agencies of all levels. Access to water is one of basic development priorities for Philippine government and local communities, therefore the risk of lack of political support is minimal.
Lack of support for the project from the local governments (change of local priorities due to elections)	1	3	3	
Lack of support from the national and regional government to the project	1	2	2	
<b>ENVIRONMENTAL</b>				
Extreme weather events impacting project sites, disrupting supply of equipment and impacting execution of the investment component	2	1	2	The project site is in the area which is not prone to severe weather events – typhoons, however occurrence of extreme events may disrupt supply chains. This poses a minor risk of possible small delays for the project.
Improper treatment of brine from desalination process causing damage to marine environment	1	2	2	Environmental risks have been analysed in the Environmental and Social Impact Study and relevant mitigation measures have been included in the project design, including proper treatment of brine. The discharge of brine will be designed according to the guidance provided in the ESIA/ESMP.  Potential productive use of brine has also been proposed within the ESIA and may be explored during project implementation.
<b>OTHER</b>				
COVID-19 (or other) pandemic, leading to a delay in implementation	1	2	2	The project has been developed during the Covid-19 pandemic, which did not prevent consultations on the project, as the lockdown periods were limited and the online meetings were well prepared and effective.
Military conflict or civil unrest in the area	1	3	3	The risk is out of control of the project. In case of a conflict situation project activities will be put on hold and resumed when security conditions would allow for further execution of the project.

## C. Measures for environmental and social risk management

*Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.*

Overall, to mitigate negative impacts of the interventions highlighted in the checklist included in Section K: Part II, an Environmental and Social Management Plan (ESMP) has been developed (Annex A), a gender analysis conducted along with the development of a gender action plan (Annex C), and a grievance mechanism described in section D. Monitoring and Evaluation Arrangements.

Based on the areas where there may be potential impacts and risks and where further assessment and management required for compliance, the individual risks have been identified per the AF's ES Principles and mitigation measures developed. These are further integrated into the ESMP.

## D. Monitoring and evaluation arrangements

*Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan, in compliance with the ESP and the Gender Policy of the Adaptation Fund.*

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and AF procedures. The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by doing the following:

- i) Tracking and reviewing project activities execution and actual accomplishments in line with workplans and ESMP and GAP.
- ii) Providing visibility into progress as the project proceeds so that the implementation team can take early corrective action if performance deviates significantly from original plans.
- iii) Adjusting and updating project strategy and implementation plan to reflect possible changes on the ground, results achieved, and corrective actions taken.
- iv) Ensuring linkages and harmonization of project activities with that of other related projects at national, regional and global levels.

M&E will comply with the rules and regulations governing the M&E of UNIDO technical cooperation projects, in particular the UNIDO Evaluation Policy and the Guidelines for Technical Cooperation, both in their respective current versions. UNIDO Project Manager will be responsible for overseeing the M&E process and activities.

A M&E plan will be developed during project inception phase, following main principles: participatory monitoring, project's risks (financial, environmental, social, institutional), adaptive management, and project's sustainability. The plan will be linked to the project rationale, log frame, and annual work plans and budgets. The M&E plan will encompass monitoring of the Gender Action Plan (GAP – Annex C) as well as the Environmental and Social Management Plan (ESMP – Annex A). Project partners will have specific M&E responsibilities assigned.

The Monitoring and Evaluation (M&E) will be based on indicators established in the project results framework (see section E of Part III) and focused on achieving the project's expected results. The status of environmental and social risks and the ESMP will be monitored throughout the project's life cycle (quarterly, yearly, mid-term and terminal report). The same applies to financial and project management risks and mitigation measures.

Annual Project Performance Reports (PPRs) will be prepared to monitor the project's progress. The PPR includes, but it is not limited to:

- a) Progress on the project's objectives and outcomes (indicators, baseline data and targets).
- b) Project's annual outputs.
- c) Annual work plan and expenditure.
- d) Annual management.
- e) Project financial and management risks.
- f) Implementation of ESMP, including measures required to minimize or mitigate risks.
- g) Lessons learned.

The reports will also describe corrective actions. UNIDO will ensure baseline and progress data to be fully collected for the project's PPR. Data collection is necessary to demonstrate the impact of the project's components, as well as the efficient use of the resources invested.

The Mid-Term Review (MTR) and Terminal Evaluation (TE) will be prepared in line with UNIDO Evaluation Policy and the Guidelines for Technical Cooperation by an independent evaluator as established in the M&E Plan. One MTR will be carried out in the project half-time of implementation and a final independent TE at least one month before the completion of the project. UNIDO will be responsible for the execution of the MTR and TE of the project. The UNIDO project manager will inform UNIDO Evaluation Group at least 6 months before project completion about the expected timing for the TE. The UNIDO Evaluation Group will then manage the terminal evaluation in close consultation with the project manager.



The independent TE will take place as the last activity before program closing, in line with the AF guidance. This evaluation will focus on delivery of the program's results, as initially planned and reflected in the M&E framework, including implementation of environmental and social mitigation measures. The TE will assess the impact and sustainability of results, including their contribution to capacity building and the achievement of the project's gains and benefits.

The following documents will be prepared in the context of project M&E:

- a) M&E plan.
- b) Project inception report.
- c) Annual Project Performance Reports,
- d) Mid-Term and Terminal Evaluation reports.
- e) Technical reports associated with different program's components.

All monitoring and evaluation documents, such as progress reports, terminal evaluation report, and thematic evaluations (e.g., capacity needs assessment), as well as publications reporting on the project, will include gender dimensions to enhance awareness of women's role as well as gender issues in the water-energy-food nexus and seaweed value chain.

**Table 20. Tentative budget for monitoring M&E (included in the Project Execution Cost)**

Type of M&E Activity	Responsibility	Budget (USD)	Timeframe
Inception Workshop and inception report including M&E plan	UNIDO	30,000	Within first three months of project start
Specialist - E&S and Gender	UNIDO, external consultant	40,000	Regularly to feed into project management and Annual Project Review
Project Steering Committee (PSC) Meetings	UNIDO, MinDA	40,000	Annually to coincide with the Annual Project Review and ad hoc when urgent and important decisions need approval of SC
Mid-term review	UNIDO, MinDA, M&E specialists as required	40,000	Year 3 of project execution
Project Terminal Evaluation	UNIDO, MinDA, Independent external evaluators	80,000	Evaluation at least one month before the end of the project.
Travel and logistics (Training workshops on M&E and Supervision visits)	UNIDO, MinDA	50,000	Annually, as required, throughout the project
<b>Total indicative cost</b>		<b>280,000</b>	

### Grievance mechanism

The project will utilize UNIDO's established grievance mechanism, which ensures transparency and tracking of all reported issues. The grievance mechanism enables stakeholders to report issues through email, phone, fax, by a letter or in person. The reporting guidelines are available at <https://www.unido.org/overview-report-wrongdoing/how-report-wrongdoing-or-adverse-environmental-and-social-impacts>.

Additionally, the project will establish a project-level grievance mechanism and will enable reporting of all concerns to the national project manager responsible for the project. Local population will be informed about existing grievance mechanisms (during consultations, information plates/posters) and contractors engaged for execution of the project activities will be required in the TORs to appoint one staff member as a liaison officer for each worksite to receive complaints and initiate corrective action as appropriate. Further details of grievance mechanisms are given in Annex A, section 9.3.

## E. Results framework for the project proposal

Include a results framework for the project proposal, including milestones, targets and indicators, including one or more core outcome indicators of the Adaptation Fund Results Framework, and in compliance with the Gender Policy of the Adaptation Fund.

**Table 21. Project's result framework**

Project Objective(s)	Project Objective Indicators	Target			Means of verification and responsibility	Assumptions
		Baseline	Mid-term	End		
Support communities in Tawi-Tawi in securing climate-resilient water access in a gender-responsive manner	Percentage of Sibutu and Sitangkai population with access to reliable and resilient clean water source	7%	50%	100%	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  Resp.: UNIDO HQ	Access to water is a priority development goal for the Philippine government at all levels (national, regional, local), it is also basic need of island communities. Currently only 7% of the targeted population has reliable access to water.

	AF 4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change (by sector and scale)	0	2	2	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Two water districts will be established – one in Sitangkai and one in Sibutu. Water districts are effective solutions managing water supply in selected areas, established as special corporate entities under Philippine law. Currently no water districts are in the project area and there is no proper water management system implemented.
	AF 4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)	0	1	3	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	A water distribution network and desalination plant will be constructed in Sitangkai. The water distribution network will be upgraded in Sibutu. Small-scale desalination plants offer a reliable, cost-effective solution for provision of water, where no good-quality ground water sources are available. Sitangkai groundwater source is brackish and exposed to increasing salinity, due to increasing sea-level. Clean water needs to be imported – desalination plant is a good solution in these circumstances.

**Component 1. Deployment of a resilient water supply systems integrated with existing RE infrastructure in Tawi-Tawi**

**Outcome 1.** Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities

Output 1.1. Water and sanitation infrastructure designed to enhance gender equality and women's empowerment Output 1.2. Desalination plant commissioned in Tongmageng and water distribution system set up in Sitangkai applying a gender-responsive approach	Desalination capacity installed in the project area	0 CMD	1000 CMD	1000 CMD	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Considering current water demand, based on surveys done for water feasibility study, 1000 cubic meters per day of desalination capacity will provide entire population with clean water. Reverse osmosis technology does not require much space and energy; therefore, it is well suited for island deployment. The site for desalination facility is made available by the Sitangkai LGU. Since women and girls are the ones having the responsibility to collect water the system will be designed jointly with women and make sure that it is suitable for operation by women and girls.
Output 1.3. Water distribution system in Sibutu is retrofitted and upgraded to level 3 according to accepted national technical standards improving women's livelihoods Output 1.4. Pilot, gender-responsive, collective rainwater harvesting and sanitation systems installed in Sibutu and Sitangkai	Water distribution systems upgraded in the project area	0	0	2	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Currently existing water distribution systems are not fully functional – they do not provide enough good quality (disinfected) water on Sibutu. The water distribution system on Sitangkai supplies brackish water to only limited part of the population. To secure reliable water access to Sitangkai and Sibutu population upgrading of the water systems is required and LGU will provide support and engage in the system development. Since women and girls are the ones having the responsibility to collect water the system will be designed jointly with women and make sure that it is suitable for operation by women and girls.
	Additional PV capacity installed for the water system	0	1000 kWp	1000 kWp	Annual Project Performance Reports (PPR) Mid-term and final project evaluations	Estimated power demand for operation of the desalination plant at full capacity is 4,000 kWh per day. To mitigate climate change impact of electricity production from fossil fuels, the desalination facility will be powered from hybrid solar-diesel system.

					<i>Resp.: UNIDO HQ</i>	Existing hybrid power plant does not have enough capacity to power the desalination facility, therefore additional PV modules need to be installed to cover the increased power demand.
	Number of women with improved water access	0	5,000	35,000	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Assuming 100% water supply for both Islands, yields the following number of direct beneficiaries: Sibutu and Sitangkai: Total population (estimate) = 71,562 Total male = 36,500 Total female = 35,062 Women will benefit from gender responsive design of the water distribution network, which will make water more easily available, reducing time and effort for women to ensure water supply at homes.
	New demonstration collective rainwater harvesting systems installed	0	5	10	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	An overwhelming majority of the households in Sibutu and Sitangkai rely on rainwater as their direct source of water for drinking and domestic use. However, the rainwater washes air pollutants, dust, dirt, bird and animal droppings, leaves, paint, and other materials from a catchment area to its storage area. Currently the rainwater harvesting practice does not consider pollution issue, thus the practices need to be upgraded to reduce health risks. Since women and girls are the ones having the responsibility to provide water for the families the system will be designed jointly with women and make sure that it is suitable for operation by women and girls.
	New demonstration sanitation systems installed that are gender-responsive	0	5	10	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Both Sibutu and Sitangkai have unique needs in terms of sanitation due to small land area, fragile ground water systems, increasing population density, especially in the coastal areas, and low income to pay for improvements. Specifically, a problem with hanging latrines disposing fecal waste directly to water create health and environmental risk, also impacting seaweed productivity. A baseline survey on Hygiene and Sanitation conducted revealed that specific improvements are feasible at both islands. Due to traditional gender norms and roles women and girls have specific needs for sanitation systems that will be addressed.

## Component 2. Capacity building and awareness raising at the local level in Tawi-Tawi

### Outcome 2. Local management structures strengthened, LGUs trained and relevant plans prepared

Output 2.1. Water service management system in Sibutu and Sitangkai operationalized	Number of water districts established and operationalized	0	2	2	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Currently no water districts are in the project area and there is no proper water management system implemented. Local governments are not capable of sustaining water distribution networks (water districts) despite interest. The set-up and operationalization of water districts will be one of the first activities of the project to ensure proper water distribution in the islands. Since women are the ones responsible for
Output 2.2. Local development planning strengthened on gender-transformative climate change						

adaptation approaches						water collection their involvement and leadership is key in this activity.
	Number of LGUs representatives trained in water system management and operations	0	30 (40%F 60%M)	60 (40%F 60%M)	Training reports with attendance lists <i>Resp.: PMU</i> Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	Specific training in climate-resilient, inclusive, gender-sensitive infrastructure and public services management and operation is required to build capacity of local governments to sustain project outcomes.  The capacity building will focus on ensuring equitable access to water for all groups, including specific needs of women and youth.  For each municipality (Sitangkai and Sibutu) minimum 5 representatives will be trained and additionally at least 2 representatives of each barangay (25).  Due to low share of women employees in LGUs only 40% share of women is targeted. Conditions for women participation in trainings will be facilitated (childcare available).
	Number of LGUs representatives trained in gender and youth mainstreaming in development and climate justice (ratio of women/men)	0	125 (40%F 60%M)	250 (40%F 60%M)	Training reports with attendance lists <i>Resp.: PMU</i> Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	It is important to build capacity and increase awareness of climate justice and gender and youth mainstreaming into development agendas of the LGUs and daily operations.  Whenever possible, the project will work with partners that include women in leadership positions, as women are good at motivating other women to participate.  Due to low share of women employees in LGUs only 40% share of women is targeted. Conditions for women participation in trainings will be facilitated (childcare available).
	Number of Local Climate Change Action Plans prepared	0	0	2	Annual Project Performance Reports (PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	The Climate Change Act of 2009 recognizes the role of local governments as frontline agencies in the formulation, planning, and implementation of climate action plans in their respective areas, consistent with the provisions of the Local Government Code, the National Framework Strategy for Climate Change, and the National Climate Change Action Plan. A LCCAP is the action plan formulated by local governments to address climate change concerns. It focuses on both climate change adaptation and mitigation and describes how LGUs plan to respond to the impacts of climate change and mainstream them into local development plans.  Currently there are no plans prepared for Sitangkai and Sibutu.  Since climate change has a differentiated impacts on women and men, girls and boys, gender and intergenerational dimensions will be included into the climate change action plan.

**Component 3. Upgrading of seaweeds industry in Tawi-Tawi**

**Outcome 3. Seaweed production strategies strengthened in relation to climate change impacts, including variability**

Output 3.1. Differentiated gender groups and sub-groups in Seaweed farming communities supported with relevant skills and	Strategies for climate-resilient seaweed farming prepared	0	1	1	Annual Project Performance Reports (PPR) Mid-term and final project evaluations	Seaweed productivity is declining due to poor farming and sanitation practices, exacerbated by climate change.  Additionally organizational opportunities exist which may strengthen the communities and increase their income making the communities more resilient to
---------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------	---	---	---	------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>solutions to address climate change</p> <p>Output 3.2. Seaweed producing women groups on each island established or strengthened with direct capacity building support.</p>					<p><i>Resp.: UNIDO HQ</i></p>	<p>climate change impacts.</p> <p>Country strategies (The Philippine Seaweed Industry Roadmap (2022-2026)) and solutions exist which need to be adapted to local context.</p> <p>Strategies need to consider the different roles of women, men and youths in the seaweed value chain.</p>
	Number of seaweed farming cooperatives provided with strategic support in value-added seaweed processing	0	2	6	<p>Annual Project Performance Reports (PPR)</p> <p>Mid-term and final project evaluations</p> <p><i>Resp.: UNIDO HQ</i></p>	<p>Seaweed communities organizing themselves in cooperatives have opportunities for scaling up seaweed production, including access to production loans and grants to build land-based and floating seaweed dryers increasing their production capacity.</p> <p>Since women, men and youths are responsible for different parts of the seaweed value chain it needs to be ensured that all groups are able to participate and contribute to the cooperatives.</p>
	Number of women groups / cooperatives established	0	2	4	<p>Annual Project Performance Reports (PPR)</p> <p>Mid-term and final project evaluations</p> <p><i>Resp.: UNIDO HQ</i></p>	<p>Women's role in seaweed value chain is often not recognized. To empower women the project will support local communities in establishing women cooperatives, support groups.</p> <p>Whenever possible, the project will work with partners that include women in leadership positions, as women are good at motivating other women to participate.</p> <p>At least 2 groups at each island will be established.</p>
	Number of seaweed farming women trained	0	500	1000	<p>Training reports with attendance lists</p> <p><i>Resp.: PMU</i></p> <p>Annual Project Performance Reports (PPR)</p> <p>Mid-term and final project evaluations</p> <p><i>Resp.: UNIDO HQ</i></p>	<p>Engaging seaweed community members in enduring sustainability of the project outcomes - specific training, addressing distinctive needs of men, women and youths is important part of building community resilience.</p> <p>Gender asymmetries of vulnerability prevail; women's work and roles are not recognized or are only associated with domestic tasks.</p> <p>Whenever possible, the project will work with partners that include women in leadership positions, as women are good at motivating other women to participate.</p> <p>Conditions for women participation in trainings will be facilitated (childcare available).</p>
	Number of seaweed farming men trained	0	500	1000	<p>Training reports with attendance lists</p> <p><i>Resp.: PMU</i></p> <p>Annual Project Performance Reports (PPR)</p> <p>Mid-term and final project evaluations</p> <p><i>Resp.: UNIDO HQ</i></p>	<p>Engaging seaweed community members in enduring sustainability of the project outcomes - specific training, addressing distinctive needs of men, women and youths is important part of building community resilience.</p> <p>Gender asymmetries of vulnerability prevail; women's work and roles are not recognized or are only associated with domestic tasks.</p> <p>Men will be sensitized and trained on different needs of each group in the seaweed value chain.</p>
	Number of youths from seaweed farming families (25 years old or younger) trained	0	500	1000	<p>Training reports with attendance lists</p> <p><i>Resp.: PMU</i></p> <p>Annual Project Performance Reports</p>	<p>Youths are a vulnerable population, affected by education, training, and employability limitations.</p> <p>Knowledge dissemination for youths should consider these factors to be sufficiently attractive and motivating.</p>



					(PPR) Mid-term and final project evaluations  <i>Resp.: UNIDO HQ</i>	Their participation in training could be linked to school attendance to make sure that school dropout is not supported.  Training for youths will need to be prepared in an attractive and engaging way.
--	--	--	--	--	-------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Component 4. Awareness raising and knowledge sharing**

**Outcome 4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared**

Output 4.1. Differentiated gender groups and sub-groups in Local communities trained in climate change adaptation solutions  Output 4.2. Knowledge disseminated to other regions with seaweed producing women's groups	Number of Knowledge Management Plans prepared (gender-responsive)	0	1	1	Knowledge Management Plan <i>Resp.: PMU</i> Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	The Knowledge Management Plan is key in securing proper documentation of lessons learnt during the project and successful dissemination of project results.  A comprehensive plan for documenting project results and strategies for knowledge dissemination targeting various groups will support overall project sustainability and scale-up potential.  Since women and men have different roles in the seaweed value chain, as well as in natural resource management, involvement of both genders is important for reaching sustainable results.  Since future generations will bear the brunt of climate change it is also important to involve youths to ensure intergenerational climate justice.
	Number of project lessons learnt documents prepared	0	0	1	Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	
	Number of site visits/ study tours conducted (ratio women/men)	0	2 (50%F 50%M, incl. 50% youth)	4 (50%F 50%M, incl. 50% youth)	Study tours reports with attendance lists <i>Resp.: PMU</i> Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	
	Number and ratio of women/men participating in knowledge dissemination activities	0	1000 (50%F 50%M, incl. 50% youth)	2000 (50%F 50%M, incl. 50% youth)	Training reports with attendance lists <i>Resp.: PMU</i> Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	
	Dissemination events organized in the Philippines	0	1	5	Annual Project Performance Reports (PPR) Mid-term and final project evaluations <i>Resp.: UNIDO HQ</i>	

**Component 5: Project scaling up**

**Outcome 5. Scaling up of project outcomes facilitated**

Documentation and plans for project scale up in the Philippines prepared	Stakeholder consulted, scale-up proposals prepared	0	0	1	Consultation reports, meeting minutes <i>Resp.: MinDA</i> Scale-up project proposal Final project evaluation <i>Resp.: UNIDO HQ</i>	Government partners at regional and national levels willing to support scaling up of project actions in other island communities of the Philippines. Seaweed farming is widespread in the Philippines in areas with similar problems (water and electricity access).  To make sure that the proposal is youth
--------------------------------------------------------------------------	----------------------------------------------------	---	---	---	-------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

						and gender responsive consultations will be conducted with women, Women's groups, youth and youth groups.
--	--	--	--	--	--	-----------------------------------------------------------------------------------------------------------

## F. Alignment with the Results Framework of the Adaptation Fund

Demonstrate how the project aligns with the Results Framework of the Adaptation Fund

Table 22. Alignment with the Results Framework of the Adaptation Fund

Project Outcomes	Project Objective Indicators	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
<b>Support communities in Tawi-Tawi in securing climate-resilient water access in a gender-responsive manner</b>				
<b>1. Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities</b>	- Desalination capacity installed in the project area - Water distribution systems upgraded in the project area - Additional PV capacity installed for the water system - Percentage of Sibutu and Sitangkai population with access to reliable and resilient clean water source	<b>Outcome 4:</b> Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	5,650,000
	- Number of women with improved water access - Number of demonstration communal rainwater harvesting systems installed - New demonstration sanitation systems installed that are gender-responsive	<b>Outcome 6:</b> Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure access to livelihood assets	
<b>2. Local management structures strengthened, LGUs trained and relevant plans prepared</b>	- Number of water districts established and operationalized - Number of LGUs representatives trained in water system management and operations - Number of LGUs representatives trained in gender and youth mainstreaming in development and climate justice (ratio of women/men) - Number of Local Climate Change Action Plans prepared	<b>Outcome 2:</b> Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	110,000
<b>3. Seaweed production strategies strengthened in relation to climate change impacts, including variability</b>	- Strategies for climate-resilient seaweed farming prepared - Number of seaweed farming cooperatives provided with strategic support in value-added seaweed processing - Number of women groups / cooperatives established - Number of seaweed farming women trained - Number of seaweed farming men trained - Number of youths from seaweed farming families (25 years old or younger) trained	<b>Outcome 6:</b> Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure access to livelihood assets 6.2. Percentage of targeted population with sustained climate-resilient alternative livelihoods	200,000

<b>4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared</b>	- Number of Knowledge Management Plans prepared - Number of project lessons learnt documents prepared - Number of site visits/ study tours conducted - Number and ratio of women/men participating in knowledge dissemination activities	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses 3.2. Percentage of targeted population applying appropriate adaptation responses	270,000
	- Dissemination events organized in the Philippines	<b>Outcome 8:</b> Support the development and diffusion of innovative adaptation practices, tools and technologies	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level.	
<b>5. Scaling up of project outcomes facilitated</b>	- Stakeholder consulted in a gender-responsive manner and scale-up proposals prepared	<b>Outcome 8:</b> Support the development and diffusion of innovative adaptation practices, tools and technologies	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level.	60,000

## G. Detailed budget

Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Executing partners for the project will utilize detailed financial reporting template in line with UNIDO standard reporting requirements. Relevant expenditures presented in the table below, under Contractual Services category will be reported in detail by executing partners.

Table 23. Detailed project budget

	2024	2025	2026	2027	Total
<b>1. Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities</b>	<b>1,130,000</b>	<b>4,480,000</b>	<b>40,000</b>		<b>5,650,000</b>
<b>1.1. Water and sanitation infrastructure designed to enhance gender equality and women's empowerment</b>	<b>50,000</b>				<b>50,000</b>
2100 Contractual Services	50,000				50,000
<b>1.2. Desalination plant commissioned in Tongmageng and water distribution system set up in Sitangkai applying a gender-responsive approach</b>	<b>740,000</b>	<b>3,200,000</b>			<b>3,940,000</b>
1100 Staff & Intern Consultants	30,000				30,000
2100 Contractual Services	710,000	3,200,000			3,910,000
<b>1.3. Water distribution system in Sibutu is retrofitted and upgraded to level 3 according to accepted national technical standards improving women's livelihoods</b>	<b>310,000</b>	<b>700,000</b>			<b>1,010,000</b>
1100 Staff & Intern Consultants	10,000				10,000
2100 Contractual Services	300,000	700,000			1,000,000
<b>1.4. Pilot, gender-responsive, collective rainwater harvesting and sanitation systems installed in Sibutu and Sitangkai</b>	<b>30,000</b>	<b>580,000</b>	<b>40,000</b>		<b>650,000</b>
1100 Staff & Intern Consultants	30,000	580,000	20,000		630,000
1700 Nat.Consult./Staff			20,000		20,000
<b>2. Local management structures strengthened, LGUs trained and relevant plans prepared</b>	<b>50,000</b>	<b>50,000</b>	<b>10,000</b>		<b>110,000</b>
2.1. Water service management system in Sibutu and Sitangkai operationalized	50,000	30,000			80,000

2100 Contractual Services	50,000	30,000			80,000
2.2. Local development planning strengthened and awareness raised on climate justice and gender-transformative climate change adaptation approaches		20,000	10,000		30,000
1700 Nat.Consult./Staff		10,000	10,000		20,000
2100 Contractual Services		10,000			10,000
3. Seaweed production strategies strengthened in relation to climate change impacts, including variability	80,000	90,000	30,000		200,000
3.1. Differentiated gender groups and sub-groups in seaweed farming communities supported with relevant skills and solutions to address climate change	50,000	30,000	30,000		110,000
1700 Nat.Consult./Staff	50,000	30,000	30,000		110,000
3.2. Seaweed producing women groups on each island established or strengthened with direct capacity building support.	30,000	60,000			90,000
1700 Nat.Consult./Staff	30,000	60,000			90,000
4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared	35,000	85,000	85,000	65,000	270,000
4.1. Differentiated gender groups and sub-groups in Local communities trained in climate change adaptation solutions	20,000	20,000	20,000		60,000
1700 Nat.Consult./Staff	20,000	20,000	20,000		60,000
4.2. Knowledge disseminated to other regions with seaweed producing women's groups	15,000	65,000	65,000	65,000	210,000
1700 Nat.Consult./Staff	15,000	35,000	35,000	35,000	120,000
2100 Contractual Services		30,000	30,000	30,000	90,000
5. Scaling up of project outcomes facilitated		30,000	30,000		60,000
5.1. Documentation and plans for project scale up in the Philippines prepared		30,000	30,000		60,000
1100 Staff & Intern Consultants			30,000		30,000
1700 Nat.Consult./Staff		30,000			30,000
<b>Grand Total</b>	<b>1,295,000</b>	<b>4,735,000</b>	<b>195,000</b>	<b>65,000</b>	<b>6,290,000</b>

Table 24. Project execution cost by budget lines

	2024	2025	2026	2027	Total
1100 Staff & Intern Consultants	35,000	20,000	60,000	100,000	215,000
1101 Technical Services					-
1500 Local travel	12,500	12,500	12,500	12,500	50,000
1600 Staff Travel	25,000	10,000	10,000	10,000	55,000
1700 Nat.Consult./Staff	50,000	50,000	50,000	50,000	200,000
1701 Tech/Admin Support					-
2100 Contractual Services	5,000	5,000	5,000	5,000	20,000
3000 Train/Fellowship/Study					-
35000 International Meetings					-
4300 Permits	4,950	5,000	5,000	5,000	19,950
4500 Equipment					-
5100 Other Direct Costs					-
<b>Total</b>	<b>132,450</b>	<b>102,500</b>	<b>142,500</b>	<b>182,500</b>	<b>559,950</b>

Table 25. Project execution cost by activities

Activity	Responsibility	Total
Project supervision	UNIDO	40,000
Project management unit (PMU) - da-to-day project management, reporting (Annual Project Performance Reports) etc.	UNIDO	200,000
PMU office space	UNIDO	19,950
Inception Workshop and inception report including M&E plan	UNIDO	15,000
Inception Workshop and inception report including M&E plan	UNIDO	15,000
Specialist - E&S and Gender, supporting project monitoring and reporting	UNIDO, external consultant	40,000
Project Steering Committee (PSC) Meetings – venue and services	UNIDO, MinDA	20,000
Project Steering Committee (PSC) Meetings – travel	UNIDO, MinDA	40,000
Mid-term review	UNIDO, MinDA, M&E specialists as required	40,000
Project Terminal Evaluation	UNIDO, MinDA, Independent external evaluators	80,000
Travel and logistics (Training workshops on M&E and Supervision visits)	UNIDO, MinDA	50,000
<b>Total</b>		<b>559,950</b>

## H. Disbursement schedule

Table 26. Disbursement schedule



	Upon signature of Agreement	One Year after Project Start a)	Year 2b)	Year 3	Total
Scheduled date	Jan-24	Jan-25	Jan-26	Jan-27	
Project activities	1,295,000	4,735,000	195,000	65,000	6,290,000
Project execution cost	115,284	421,520	17,359	5,786	559,950
Implementing Entity Fees	119,874	438,304	18,051	6,017	582,246
<b>Total</b>	<b>1,530,158</b>	<b>5,594,825</b>	<b>230,410</b>	<b>76,803</b>	7,432,196

**PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY**

**A. Record of endorsement on behalf of the government<sup>2</sup>**

*Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<i>Atty. Analiza Rebuelta- Teh Undersecretary and Adaptation Fund Designated Authority Department of Environment and Natural Resources</i>	<i>Date: December 20, 2022</i>
------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------

**B. Implementing Entity certification**

*Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation (Plans Ambisyon Natin 2040, The Philippine Development Plan 2023-2028, Nationally Determined Contribution, National Framework Strategy on Climate Change , National Climate Change Action Plan, National Adaptation Plan, National Disaster Risk Reduction and Management Plan, Philippine Water Supply Sector Roadmap, National Renewable Energy Program) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

*Ms. Fatou Haidara*  
*Managing Director*

*Directorate of Global Partnerships and External Relations*

Implementing Entity Coordinator

Date: (Month, Day, Year)

Tel. and email:

+43 1 26026 3708

[f.haidara@unido.org](mailto:f.haidara@unido.org)

[gef@unido.org](mailto:gef@unido.org)

[g.onysko@unido.org](mailto:g.onysko@unido.org)

[j.blaser@unido.org](mailto:j.blaser@unido.org)

Project Contact Person:

Katarina Barunica

Industrial Development Officer

Tel. And Email:

[k.barunica@unido.org](mailto:k.barunica@unido.org)

+43 1 26026 3803



Republic of the Philippines  
**Department of Environment and Natural Resources**

Visayas Avenue, Diliman, Quezon City, 1128  
Tel. Nos. (632) 8929-66-26 to 29 • (632) 8929-62-52  
8929-66-20 • 8929-66-33 to 35 • 8929-70-41 to 43  
Email: [web@denr.gov.ph](mailto:web@denr.gov.ph); Website: <https://denr.gov.ph>

Adaptation Fund

<https://www.adaptation-fund.org>

In my capacity as the Philippines Designated Authority for Adaptation Fund, I am endorsing the request for extension of the full proposal submission of the United Nations Industrial Development Organization (UNIDO), as the Implementing Entity of the proposal entitled "Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi" which is led by the Mindanao Development Authority (MinDA).

The extension request emanates from (i) the adjustment in project scope to meet the beneficiaries' needs; and (ii) increase in project budget from USD5.5 million to USD7.5 million resulting from the changes in scope and increased prices due to inflation. UNIDO aims to submit the project proposal in February 2023, after the completion of three-level stakeholder consultations in January 2023.

Rest assured that the DENR will continuously coordinate with UNIDO and MinDA on the completion of the project proposal.

Date: 20 DEC 2022

Signature:

**ATTY. ANALIZA REBUELTA-TEH**

Undersecretary for Finance, Information Systems and Climate Change  
Department of Environment and Natural Resources (DENR)



United Nations Industrial Development Organization

**PROPOSED PROJECT**  
**HARNESSING THE WATER-ENERGY-FOOD NEXUS TO ADDRESS**  
**AND ADAPT TO CLIMATE CHANGE IMPACTS IN TAWI-TAWI,**  
**PHILIPPINES**  
(UNIDO SAP ID 210194)

**Environmental and Social Impact Assessment (ESIA) Study**

**for the**

**Development and Rehabilitation of Potable Water Supply System**  
**and Improvement of Rainwater Harvesting and Sanitation Systems**  
**in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines**

Final Condensed Version  
May 31, 2023



## TABLE OF CONTENTS

TABLE OF CONTENTS .....	ii
LIST OF FIGURES .....	iv
LIST OF TABLES .....	iv
ABBREVIATIONS and ACRONYMS .....	v
EXECUTIVE SUMMARY .....	1
1. INTRODUCTION .....	3
1.1 The Water Supply Dilemma of Sibutu and Sitangkai Island .....	4
1.2 Background of the Project .....	6
1.3 ESIA Study Area .....	6
1.4 Purpose of the ESIA Study and Key Deliverables .....	6
1.5 Scope of Work .....	8
1.6 Methodologies and Approaches .....	8
1.7 Study Activities .....	8
1.8 Project Proponents and ESIA Consultants .....	9
1.9 This ESIA Report .....	9
2. POLICY LEGISLATIVE, REGULATORY, AND ADMINISTRATIVE CONSIDERATIONS .....	9
2.1 National Laws and Regulations .....	9
2.2 Relevant International Legislation and Environmental Assessment Regulations .....	11
2.3 Other Multilateral Environmental Agreements (MEAs) .....	11
2.4 Water Quality .....	11
2.4.1 Physical and Chemical parameters .....	11
2.4.2 Microbiological parameters .....	12
3. ANALYSIS OF ALTERNATIVES TO THE PROPOSED PROJECT .....	13
3.1.1 Current Situation and the Need for Potable Water Supply .....	13
3.1.2 Analysis of Alternatives and Its Environmental and Social Impact .....	13
3.1.3 The “No Project” Option .....	15
4. DESCRIPTION OF PROPOSED PROJECT AND JUSTIFICATION .....	15
4.1 General description of project .....	15
4.2 Details of the project .....	16
4.2.1 Project location and general accessibility .....	16
4.2.2 Size, scope, capacity, design basis .....	17
4.2.3 Water treatment .....	18
4.2.4 Process description of SWRO desalination system .....	18
4.2.5 Solar PV facility .....	20
4.2.6 Site development plan .....	21
4.2.7 Pilot demonstration of communal rainwater catchment .....	22
4.2.8 Pilot demonstration of communal sanitation and hygiene .....	23
4.2.9 Pre-construction activities .....	24
4.2.10 Construction activities .....	24
4.2.11 Post-construction activities .....	25
4.2.12 Scheduling, staffing and support .....	25
4.2.13 Life span .....	26
4.2.14 Operation and maintenance activities .....	26
4.2.15 Facilities and services, required off-site facilities .....	26
4.2.16 Solid, liquid, and gaseous discharges .....	26
4.2.17 Sources of nuisance (noise, odor, visual nuisance) .....	26
4.2.18 No need for resettlement plan or development plan for vulnerable groups .....	27
5. DESCRIPTION OF THE PROJECT ENVIRONMENT AND SOCIAL CONTEXT .....	27
5.1 Physical environment .....	27
5.1.1 Climate and meteorology .....	27
5.1.2 Topography, geology, and soils .....	27
5.1.3 Inducement of natural hazards .....	28
5.1.4 Terrestrial Flora and Fauna .....	30
5.1.5 Surface Water and Groundwater Hydrology .....	30
5.1.6 Ambient Air Quality .....	31
5.1.7 Existing Sources of Air Emissions .....	31
5.2 Biological Environment .....	31
5.2.1 Marine and oceanographic characteristics .....	31

5.2.2	Coastal and marine flora and fauna .....	31
5.2.3	Existing marine water pollution discharges .....	33
6.	POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROPOSED PROJECT .....	33
6.1	Environmental impacts .....	34
6.1.1	Possible environmental impacts during pre-construction and design phase .....	34
6.1.2	Possible environmental impacts during construction phase .....	36
6.1.3	Possible environmental impacts during post-construction and operation phase .....	38
6.2	Social impacts .....	39
6.2.1	Possible social impacts during pre-construction phase .....	40
6.2.2	Possible social impacts during construction phase .....	40
6.2.3	Possible social impacts during post-construction and operation phase .....	42
6.2.4	Assessment of key impacts and mitigating measures .....	42
7.	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) .....	46
7.1	Environmental Management Plan (EMP) .....	46
7.1.1	Environmental Mitigation Measures .....	46
7.1.2	Environmental Monitoring Program .....	46
7.1.3	Institutional Arrangements .....	46
7.2	Social Management Plan (SMP) .....	46
7.2.1	Social Mitigation Measures .....	46
7.2.2	Social Monitoring Program .....	46
7.2.3	Institutional Arrangements .....	46
8	COORDINATION AND PUBLIC/NGO PARTICIPATION .....	72
8.1	Introduction .....	72
8.2	Key findings during the consultation meetings with stakeholders .....	72
8.3	Project Disclosure .....	77
9	SAFETY MEASURES DURING OPERATION .....	77
9.1	National Laws and Regulations .....	77
9.2	Environmental and Social Management Plan (ESMP) .....	78
9.2	Emergency Response Policy Plan (ERPP) .....	78
9.3	Grievance Management Mechanism (GMM) .....	78
10	CONCLUSIONS .....	79
	REFERENCES .....	81
	ANNEXES .....	82
	ANNEX A. Professionals and organizations that have contributed to the preparation of the ESIA Report .....	82
	ANNEX B. List of consulted documents, including project-related reports and baseline data referred to in the report .....	82
	ANNEX C. Baseline data referred to in this report: Detailed project environment context .....	82
	ANNEX D. Baseline data referred to in this report: Terrestrial and marine flora and fauna .....	82
	ANNEX E. Record of consultation meetings with stakeholders .....	82
	ANNEX F. EIA-SEP Household Survey Report .....	82

## LIST OF FIGURES

Figure 1.1. The location of the two island municipalities and its existing power source as captured and geotagged using Google Earth.....	7
Figure 1.2. The geopolitical boundaries of Sibutu and Sitangkai Islands with the locations of its .....	7
Figure 4.1. General project location in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines.....	17
Figure 4.2. Accessibility map of the project sites in Sibutu and Sitangkai Islands from the.....	17
Figure 4.3. Simplified process flow diagram for SWRO desalination process .....	19
Figure 4.4. Simplified diagram for a containerized or modularized UF and SWRO systems.....	19
Figure 4.5. Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant.....	20
Figure 4.6. Site development plan for the desalination facility with additional 1 MWp solar PV system.....	22
Figure 4.7. Examples of rudimentary rainwater harvesting systems in Sibutu and Sitangkai.....	22
Figure 4.8. Schematic diagram of a shared communal rainwater harvesting system.....	23
Figure 4.9. Illustrative example of communal rainwater harvesting clusters along the coastline.....	23
Figure 4.10. Illustrative example of communal rainwater harvesting with a cluster of households in a network of canals and bridges .....	23
Figure 4.11. Illustrative example of a comb-like network of shared communal sanitation system with a cluster of households along the coastline .....	24
Figure 4.12. Illustrative example of a web-like network of shared communal sanitation system with a cluster of households along canals or foot bridges.....	24

## LIST OF TABLES

Table 2.1. Standard values for physical and chemical qualities of drinking water .....	12
Table 3.1. Alternative processes for water treatment and supply for small island application .....	14
Table 4.1. Water quality parameters and standards.....	18
Table 4.2. Manpower requirements during construction and operation phases .....	25
Table 4.3. Pollution control strategies for the project.....	26
Table 5.1. Description of natural hazards in assessing the project sites .....	29
Table 5.2. Diversity Indices of the sampled sites in Sibutu Island .....	32
Table 5.3. Summary of the diversity indices of the sampled sites in Sitangkai Island .....	32
Table 6.6.1. Overall Summary – Evaluation of Environmental and Social Impact of the Project.....	44
Table 7.1. Environmental Mitigation Measures.....	47
Table 7.2. Environmental monitoring program.....	52
Table 7.3. Institutional strengthening and training activities for implementation.....	55
Table 7.4. Training activities for implementation.....	55
Table 7.5. Social Mitigation Measures .....	57
Table 7.6. Social Monitoring Program.....	64
Table 7.7. Institutional strengthening and training activities for implementation .....	69
Table 7.8. Proposed Training Activities .....	70
Table 8.1. Summary of the discussion and action points of the meeting facilitated by MinDA .....	72
Table 8.2. Summary of the issues and concerns during the consultation and its suggested solutions .....	73
Table 8.3. Communication Plan in reporting progress and updates during project implementation .....	77

## ABBREVIATIONS and ACRONYMS

AF	Adaptation Fund
ASEAN	Association of South East Asian Nations
BARMM	Bangsamoro Autonomous Region of Muslim Mindanao
BLGU	Barangay Local Government Unit
CIP	Clean-In-Place
COC	Code of Conduct
CNC	Certificate of Non-Compliance
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
DPP	Diesel-fired Power Plant
DPWH	Department of Public Works and Highways
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EMB	Environmental Management Bureau
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESSPP	Environmental and Social Safeguards Policies and Programs
EU-ASEP	European Union-Access to Sustainable Energy Program
GES	General Effluent Standards
GHG	Greenhouse gas
GMM	Grievance Management Mechanism
IEC	Informational-Educational Campaigns
IP	Indigenous Peoples
IWRM	Integrated Water Resources Management
LGU	Local Government Unit
LWUA	Local Waterworks Utilities Administration
MENRE	Ministry of Environment, Natural Resources, and Energy
MGB	Mines and Geosciences Bureau
MinDA	Mindanao Development Authority
MLGU	Municipal Local Government Unit
NAMRIA	National Mapping and Resources Information Administration
NPC-SPUG	National Power Corporation-Small Power Utility Group
NWRB	National Water Resources Board
PD	Presidential Decree
PEISS	Philippine Environmental Impact Statement System
PMU	Project Management Unit
PPDO	Provincial Planning and Development Office
PNSDW	Philippine National Standards of Drinking Water
PSG/PAG	Project Steering/Advisory Group
RA	Republic Act
RE	Renewable Energy
RO	Reverse Osmosis
RETS	Renewable Energy Technologies for Seaweeds production
SMP	Social Management Plan
SIA	Social Impact Assessment
Solar PV	Solar photovoltaics
SWM	Solid Waste Management
SWRO	Sea Water Reverse Osmosis
TAWELCO	Tawi-Tawi Electric Cooperative
TOR	Terms of Reference
UNIDO	United Nations Industrial Development Organization
WASH	Water, Sanitation, and Hygiene
WQG	Water Quality Guidelines
WQS	Water Quality Standards
WSP	Water Service Provider

## EXECUTIVE SUMMARY

Small, rural, off-grid islands are often suffering from energy-water-food scarcity which is exacerbated by global concerns on climate change. The Philippines, which is composed of over 7,641 islands located in the far eastern part of the Pacific, is very vulnerable to these risks associated with climate change. In this study, the local communities of Sibutu and Sitangkai Islands located in Tawi-Tawi, Philippines, are considered as they suffer from energy-food-water scarcity, which is aggravated by the climate change phenomenon. Unpredictable weather conditions and seawater level rise cause havoc to the seaweed farming and fishing productivity, which is their major source of livelihood. Water is already scarce but with unpredictable rainfall patterns, this is further worsened.

Given their geographic location, these island communities have serious water supply issues. The province struggles with intermittent and unreliable access to clean drinking water, leading many to resort to unsafe or environmentally unfriendly practices like deep well drilling in search of water. Moreover, since potable water is scarce in these communities, residents mostly source them from the mainland at higher costs. Their vulnerability, especially that of Sitangkai, is intensified when adverse weather impedes them from traveling to neighboring islands to source vital supplies.

This report presents the findings of an **Environmental and Social Impact Assessment (ESIA)** study carried out for the **development of potable water supply and improved rainwater harvesting and sanitation systems in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines**. The main objective of this ESIA study is to identify and assess the impacts resulting from the proposed components of the project on the environment and communities, together with the environmental, biodiversity, cultural heritage, and socio-economic aspects. Identifying significant environmental and social issues associated with the project's pre-construction (and design), construction, and operation and maintenance are done so that these issues can be mitigated in the final design of these project components.

Of utmost importance in the study include identifying relevant stakeholders and describing the requirements for the integration of its engagement and participation during the ESIA process, with special consideration on the local situation or baseline condition; defining the environmental and social baseline to better assess the magnitude, significance, and temporality of the potential impacts and risks; identifying the environmental and social impacts and risks so that practical, efficient, and cultural friendly mitigation measures are provided in the project's Environmental and Social Management Plan (ESMP); and to understand and recommend comprehensive arrangements for the ESMP implementation, monitoring, and engagement strategy.

The provision of safe and potable water is a pressing need in the islands of Sibutu and Sitangkai where communities have utilized untreated ground water (Sibutu Island) and brackish groundwater from four (4) currently identified shallow wells (Sitangkai Island). Fresh drinking water in Sitangkai is sourced by harvesting rainwater, or from expensive bottled purified water transported into the island, or from bulk-hauled water transported by barge or other sea transport from neighboring islands.

The climate projection in the next 50 years indicates that all areas of the Philippines will get warmer, more so during the relatively warmer summer months. Mean temperatures in all areas in the Philippines are expected to rise by 1.8°C to 2.2°C in 2050. As a result, there is generally a decreasing trend in rainfall in Mindanao, where Sibutu and Sitangkai Islands are situated, especially by 2050. Eventually, this could worsen the already serious water supply issues in these areas. Thus, to be able to adapt to the effects of climate change, a more efficient and reliable source of potable water is needed. Verified through physical site inspections, four (4) ground water resources have been identified from four barangays in the island of Tumindao, belonging to Sitangkai. However, results on the water quality analysis in these shallow wells show that the nature of the ground water is brackish and therefore is not clean, safe, nor potable. In the case of Sibutu Island, there are at least 18 verified sites for groundwater sources, such as dug/bore wells, but all are unprotected and water is untreated.

The project is mainly composed of the (1) development and rehabilitation of physical infrastructures for water supply and distribution; more specifically, a desalination facility powered by 1.0 MWp solar PV system in Sitangkai Island and rehabilitation of the physical infrastructures for potable water supply and distribution in both islands of Sibutu and Sitangkai; and (2) institutional strengthening and behavioral change through the implementation of an integrated water resource management



(IWRM) system, educational and awareness programs on water, sanitation, and health (WASH), and proper solid waste management system. The following components of the project in both islands are:

- improvement of the water quality and supply services, including installation of a 1,000 cubic meter per day (CMD) seawater reverse osmosis (SWRO) desalination facility powered with 1.0 MWp solar PV system in Sitangkai Island, rehabilitation of current water sources (e.g., shallow/deep/bore wells) for continued domestic uses, their appropriate treatment by filtration and disinfection where needed, expansion and modernization of water supply network, and access to solar photovoltaic power plant or installation of independent solar-powered water pumps and gadgets;
- demonstration of appropriate pilot systems for sanitation and water resource management such as rainwater harvesting systems;
- Institutional strengthening and project management, including support, technical assistance, training and workshops, and establishment of a municipality-wide water district for each island as a formal water supply provider (WSP);
- Water, sanitation and hygiene (WASH) and solid waste management (SWM) awareness and educational programs; and
- Project management.

The solar-powered 1,000 CMD seawater reverse osmosis (SWRO) desalination facility is evaluated and the resulting adverse effects mitigated as far as possible. This environmental and social impact assessment (ESIA) is an adequate instrument for a systematic procedure in identifying and evaluating all potential impacts of a proposed project, and for developing appropriate mitigation measures and alternatives, such as modifications to the process or alternative project sites. As an ESIA is project- and location-specific, the scope of this study is to present a complete overview of all potential impacts and corresponding mitigation measures.

Together with the SWRO desalination facility, a 1 MWp solar PV power plant is proposed in Sitangkai Island, along with storage batteries and controls to be connected to the desalination facility. The renewable energy source is expected to generate 1.64 gigawatt-hours (GWh) of electricity and avoid at least 1,200 tons of carbon dioxide equivalent greenhouse gas emissions per year. The solar PV power plant and its associated facilities will require approximately 0.8-1.0 hectare and will be in Barangay Tongmageng, Sitangkai. This is adjacent to a currently established 1 MWp solar PV-diesel hybrid power plant being developed to augment the electricity production in the island. It is proposed therefore that any excess energy produced by the new 1 MWp solar PV power plant attached to the desalination plant can be sold to the grid, thereby increasing the renewable energy penetration and grid stability for the island.

**The main outcomes of the project** will be:

- To improve access to clean, safe, reliable, adequate potable water supply services in Sitangkai Island;
- To improve health, water, sanitation, and hygiene practices of the local communities;
- To increase resilience of the water services and waste management system to climate change;
- To enhance the operational efficiency and financial viability of the water supply service facility, in support of the climate-resilient approaches to better seaweed farming and productivity, which should sustain the livelihood and economic outputs of the local communities.

The specific objective of the project is to deploy a resilient clean, safe, and potable water supply system integrated with RE infrastructure in both Sibutu and Sitangkai Islands. With the ever-increasing demand, adequately providing water supply to these islands with the existing infrastructure has been a challenge. An assessment was recently carried out on the status of the infrastructure indicated that the water demand of these islands could not be met unless major interventions, improvements and rehabilitation are made to the existing water supply system, including the rainwater catchment. Another major challenge is the unreliable power supply as the water distribution system is entirely done by pumping with limited storage facilities. Consequently, there is a need to rehabilitate and expand the water supply and distribution systems to meet the water requirements of the residents. There is also a need to integrate disinfection of the water supply, especially the rainwater collected, to make it safer for human consumption.

The main source of income of the people in Sibutu and Sitangkai Islands is fishing, farming (inland & seaweed farming), and trading. Because the major economic activity on the islands is seaweed farming and fishing, most of the people are living near and/or along the coastal areas. About 96% of the households in these islands are living on their own lands that could either be inherited, acquired, or donated while the remaining 4% are considered by the locals as informal settlers, most of them are indigenous people (IPs) such as the Badjaos.

The majority (80%) of the people in these islands belong to the Sama ethnic group. The remaining 20% are distributed into minor ethnic tribes and sub-tribes such as Tausug, Pangutaran, Manubbul, Badjao, and Christian settlers. Moreover, the majority of the population are Muslims while the remaining percentage is distributed among Catholic and other religions. *Sinama* dialect is spoken and used by almost ninety percent (90%) of the local population in their everyday interaction. **No issue of resettlement was observed since the project sites do not involve and affect territories inhabited by indigenous peoples.** Thus, the environmental and social issues regarding this concern is not anymore addressed in detail.

The proposed activities related to the main project components include site preparation, construction works with trenching and excavation, laying of pipelines, testing, and solid replacement; installation of the 1,000 CMD desalination facility powered by 1 MWp solar PV energy source and development of the surrounding area for installation of support and auxiliary facilities, rehabilitation of water supply sources and distribution networks, development of communal rainwater catchments and improved communal sanitation infrastructures.

Improvements in domestic hygiene and sanitation lead to the reduction of health risks associated with poor water quality or inadequate access to water services as **both islands belong to the BARMM region where acute watery diarrhea is still the prevailing number one disease causing morbidity due to clean potable water scarcity.** The project is seen to contribute to the increase in local development and employment as the local population is likely to be employed during the construction and operational phase of the project, increase in land value within the project area due to the availability of water, promotion of a more sustainable and resilient use of water resources with improvements in the infrastructure such as the introduction of a metering system that will lead to the reduction of losses and encourage more efficient use of water, the availability and easy access of water will trigger other developments in the area and will encourage more economic activities such as new and improved businesses to cater to local needs.

The negative impacts caused by the project activities, specifically during the construction period are generally short-term, temporary, and reversible which can be reduced or eliminated by appropriate mitigation measures. Many of these negative impacts will only occur at active construction sites and are temporary. The potential adverse impacts are manageable if the mitigation measures defined and presented in the ESMP are followed. The only less predictable impacts which cause the most vulnerability are those related to climate risks and marine ecosystem biodiversity risks but will be taken into account in all stages of the project implementation and in the rehabilitation of physical structures. The ESIA includes an Environmental and Social Management Plan (ESMP) which details the mitigation measures, monitoring, institutional responsibilities, and capacity building. The relevant ESMP provisions should also be included in the bid and contract documents during project implementation.

In conclusion, the anticipated benefits of the project are very significant to the people and the environment of both Sibutu and Sitangkai Islands. The project will mainly provide a reliable supply of potable water to the residents of the islands and establish demonstration pilots for efficient communal rainwater harvesting and improved sanitation systems. The project also focuses on institutional strengthening by providing sufficient programs and activities for training and education in relation to water governance, waste management, seaweed farming, public health (good sanitation and hygiene practices), and financial literacy. The ESIA has found that no major short-term nor cumulative environmental or social impacts are likely to occur because the project ensures that the ESMP is updated, implemented, and monitored. **The overall environmental and socio-economic benefits of the project outweigh the potential adverse environmental and social impacts that may occur.**

## 1. INTRODUCTION

Clean water is a necessity for a decent life. As of 2020, there are still 2.3 billion people who lack access to basic hand washing facilities and over 700 million who still lack basic drinking water services, with more than 80% living in the rural areas and nearly half in least developed countries [1].

The need for access to clean water is exacerbated, especially for small island states and communities, with the intensifying global warming that results in the gradual decline of average stream flow [2], particularly observed during summer or dry seasons. Island communities typically rely on rainwater and groundwater collection, if available, for their freshwater supply. But changes in rainfall patterns, increases in severe storms, sea-level rise, and saltwater intrusion threaten many of these traditional water sources [3] which can add to extreme poverty, social tension, environmental degradation, ineffectual leadership, gender inequality, fatal risks, and other disruptions in these rural island communities. Developing rural communities like in small islands have inherently limited water supply capacity. Households in these areas may utilize low quality or contaminated water sources or purchase bottled water from the cities or the mainland at high costs to meet domestic water demand [4]. Pressure from a changing climate, population growth, and migration-tourism are increasing the demand for fresh and potable water in these small island communities, particularly in regions with poor water quality or water scarcity [3].

In island communities, the energy required for treating groundwater using conventional means is estimated to be about 0.48 kWh per cubic meter [3]. Further, the installation and operation of desalination units has become an increasingly suitable, practical and sustainable solution to address water scarcity issues, especially with the significant development in the reverse osmosis technology as well as in the commercial viability of these units [5]. Global desalination capacity has grown from 64 million cubic meter per day in 2010 to close to 98 million cubic meter per day in 2015 [6]. However, one of the many challenges of desalination technologies is the costly and considerable energy requirements needed to treat water. The energy required for seawater desalination is 2.58-8.5 kWh per cubic meter, depending on the technologies selected, as compared to 0.48 kWh per cubic meter for treating groundwater using conventional means, potentially increasing reliance on conventional fossil fuels to meet the energy needs of desalination [3]. Energy, as a focal requirement for water supply, has become one of the main limiting factors for adopting alternative water supply methods [5]. Moreover, there are several environmental and economic issues hounding the sustainability of water supply and water treatment systems, requiring a more holistic analysis of their applications. This asserts the inherent correlation of water supply chain problems and energy quality and availability, leading to the energy-water nexus concept [5] that requires an integrated developmental approach for sustainability. In recent years, several studies have provided guidelines and suggestions to improve the sustainability and efficiency of the water and energy supplies of remote, off-grid communities, with small island communities receiving special attention within the energy-water nexus domain considering the unique challenges of these communities, with several case studies underpinned in the Philippine context [7, 8, 9, 10, 11, 12, 13]. A common energy-water nexus approach, widely adopted, is to optimally design a hybrid energy system which combines renewable electricity generation with conventional power sources and storage technologies [14].

### 1.1 The Water Supply Dilemma of Sibutu and Sitangkai Island

Small island communities like Sibutu and Sitangkai Islands in the Province of Tawi-Tawi, Philippines, are typically faced with challenges in the basic needs of water and energy. Potable water is scarce in these island communities and residents mostly source it from the mainland at higher costs. Their vulnerability is intensified when adverse weather prevents them from traveling to neighboring islands to source out vital supplies such as potable water.

A prior study [15] was conducted to assess preliminary design options of appropriate water supply systems integrated with renewable energy technologies to address the problem on potable water supply and electricity in both Sibutu and Sitangkai Islands. With the use of household surveys triangulated with secondary data, interviews with stakeholders, and on-site validation, the water demand, water sources, and other demographic and socio-economic parameters of this island community are determined in this study.

The following are the key relevant findings of the study:

- Based on survey results, **the average current water demand of Sibutu Island is 153 m<sup>3</sup> per day, of which 96.8 m<sup>3</sup> is used for drinking (and cooking)**. These translate to a current water consumption per capita per day of 4.31 liters for all uses and 2.77 liters for drinking and cooking purposes alone. In Sitangkai Island, **the average current water demand is 235 m<sup>3</sup> per day where only 90.6 m<sup>3</sup> is used for drinking (and cooking)**. This means that the average daily per capita consumption is 6.05 liters for all uses and 2.33 liters for drinking (and cooking). The current demand of the islands is relatively much lower (less than 7%) of the standard requirements for households as defined by a World Bank study on the basic needs of the urban poor, which is estimated to be about 100-110 liters per capita per day. This indicates that the islands are severely deprived of clean and potable water. Communities in rural areas should

also benefit the same as what normally the city dwellers are enjoying such as clean water not only for drinking and household uses but also for economic productivity.

- **In designing options for water systems**, water demands were projected to consider an average standard consumption of 110 liters per capita per day for all purposes. At this rate, the current (year 2022) average consumption is 4,000 m<sup>3</sup> per day and 4,281 m<sup>3</sup> per day for Sibutu and Sitangkai Island, respectively. These demands are projected considering the average increase in population.
- **Rainwater is the most common source of water for drinking and domestic uses.** In Sibutu Island, about 80% of households use rainwater for drinking and 84.4% also use it for domestic purposes; in Sitangkai Island, about 96.7% of households use rainwater for drinking while 81.7% use it for domestic purposes. It is noted that stability and reliability of water sources are also threatened due to changes in rainfall patterns, attributed by increased frequency of severe storms, sea-level rise, and other impacts of drastic climate change. Further, survey results also indicate that while rainwater is the most common source of water for all uses in these islands, majority of the residents still source out their water for drinking and domestic uses outside of their own houses, confirming that majority of the households still do not have Level III water supply.
- **Sibutu has at least 18 known water sources with 16 as viable sources and only nine of which are currently operational.** These sources are in barangays Tongehat, Taungoh, Tandu Banak/Sheik Makdum, Datu Amilhamja Jaafar, Nunukan, Hadji Mohtar Sulayman, Ligayan, and Talisay. The sources in Tongsibalo, Ligayan, Nunukan, Hadji Mohtar Sulayman, and Talisay are all non-operational due to inadequate funds while the source in Nunukan is an untapped water source called Kaban-Kaban pool and has a cultural significance among locals. All water sources in Sibutu are untreated, although physical and chemical properties are moderately within the standards for drinking water. The operational sources provide Level I to Level II water service to the residents except for Tandu Banak/Sheik Makdum, which is providing Level III service but only to a small number of households in these barangays. Wherever these exist, the water supply and distribution pipelines in Sibutu are inadequate, unprotected, not well-maintained, and broken or damaged, resulting in poor, untreated, and unreliable water supply.
- Disinfection by chlorination is a good, inexpensive, and easy-to-operate method for water treatment of all water supply sources in Sibutu. Moreover, a water storage and distribution system with a capacity of about 200-400 m<sup>3</sup> per day or more is proposed for a group of barangays or for a community cluster relative to the water sources. Two options are presented for the water management in Sibutu, with the first option having a single integrated water management system under one water service provider serving all barangays. The second option is to have two integrated water resource management systems under one water service provider where each system will serve eight barangays in the island, one in the northeast side and one in the southwest, mirroring the NPC-SPUG diesel-fired power plants in the island. Wherever possible, it is highly recommended to use the available renewable energy supply (Solar PV Power Plant) in Sibutu in powering up the water supply and distribution systems or independently install solar-powered pumps to rehabilitated water sources and storage tanks.
- **Sitangkai has four water sources located in Tongmageng, Tongusong, North Larap and South Larap.** The source in Tongmageng currently provides Level II service to several barangays in the island through a newly installed piped distribution system, although water is only used for domestic purposes. All water sources in Sitangkai are salty and not potable.
- **Desalination is the recommended water treatment method for Sitangkai considering that all the island's water sources are brackish (salty) and not potable.** The island needs to have one integrated water resource management system under one water service provider and a desalination facility, preferably located in Tongmageng, where the currently installed 1.0 MWp solar PV power plant is placed.
- **Sanitation and hygiene practices in both islands need further improvement** to maintain good health and well-being among people in the island. The continuous practice of improper sanitation and hygiene can contribute dramatically to the poor economic productivity in seaweed farming since the seawater bodies around the island is the ultimate and direct dumping sites of human wastes. Detailed design options are presented in the previous report for consideration and selection by the target beneficiaries.
- In addition to sanitation and hygiene, **proper and efficient solid waste management (SWM)** should be seriously pursued in the island to tap resources from wastes, create additional jobs,

increase economic productivity in the communities, and promote circular economy. A three-phase implementation plan is drawn and recommended in this report to achieve this purpose. These findings and the subsequent recommendations present the challenging realities of the communities in both islands. Hence, this project was developed to help the target beneficiaries in exercising resilience to tackle the environmental challenges brought about by climate change and to realistically attain the good indicators for sustainable development especially in their energy-water needs.

## 1.2 Background of the Project

The project “Harnessing the water-energy-food nexus to address and adapt to climate change impacts in Tawi-Tawi” will be implemented in the two island municipalities (Sibutu and Sitangkai) in the province of Tawi-Tawi, Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), Philippines. It is targeting the water security issue in these two island municipalities. The islands are increasingly affected by climate change through a sea-level rise (saline water intrusion) and more unpredictable rains, affecting water resources available for the communities on the islands.

Both islands experienced water scarcity for drinking, household, and productive uses such as seaweed farming. Thus, there is a need to increase the adaptive capacity of the island communities through the provision of reliable, climate-resilient access to water infrastructure and services. Moreover, this is expected to strengthen livelihood and sources of income of vulnerable seaweed-producing communities in Sibutu and Sitangkai by improving the seaweed production industry. The project activities would build awareness and ownership of adaptation and climate risk reduction strategies within local communities and local government units (LGUs) as well as in the broader region. It is estimated that in both islands, a total of 71,562 people would benefit directly from the project (with 36,500 men and 35,062 women, corresponding to the 2020 population census) while an estimated 150,000 people can benefit from the project indirectly, those who are coming from neighboring islands and other areas as family relatives, business-related guests, visitors, tourists, local workers, and temporary migrants.

Prior to the implementation of this project, the Environmental and Social Impact Assessment (ESIA) study must be accomplished to ascertain the project’s potential positive and negative impacts on the communities and the environment.

## 1.3 ESIA Study Area

Tawi-Tawi (5°12’00” N 120°05’00” E) is an island province in the Philippines located in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). Seaweed farming is the main source of livelihood of the indigenous people in the province, including the Samals, Tausugs, and Badjaos. The province is the leading supplier of seaweeds in the country, encompassing up to about 70% of the total national production at some point. Despite being the largest producer of seaweeds in BARMM, Tawi-Tawi only ranks sixth in terms of product value. The island province is also among the poorest and least electrified provinces in the country. Although, it has nine served areas by the National Power Corporation-Small Power Utilities Group (NPC-SPUG), where two of these areas are underserved with only 8 to 16 hours of electricity and all areas are powered by diesel-fired power plants [16]. The islands of Sibutu and Sitangkai (see **Figure 1.1**) lie beside each other and are approximately 50 kilometers off the coast of Bongao, capital of Tawi-Tawi province. Sibutu (4°51’N, 119°28’E) is a coastal municipality with 16 barangays and a land area of 285.32 square kilometers. Sitangkai (4°39’42”N, 119°23’31”E) is also a coastal municipality with sprawling mud flats and sea grass beds, with 9 barangays and a land area of 792 square kilometers.

Currently, the RETS Project has installed a 1.0 and 0.65 MWp solar PV-diesel hybrid system in Tongmageng, Sitangkai and Taungoh, Sibutu, respectively. Together with the existing Diesel-Powered Plant (DPP) in each island, these hybrid systems are expected to serve the island’s electricity needs, as shown in **Figure 1.2**.

## 1.4 Purpose of the ESIA Study and Key Deliverables

The Environmental and Social Impact Assessment (ESIA) study aims to identify possible positive and negative impacts that this proposed project may have on the environment and communities, including the environmental, biodiversity, cultural heritage, and socio-economic aspects. The purpose of the ESIA is to ensure that stakeholders are fully informed, and decision-makers consider the resulting environmental and social impacts, both negative and positive, and put in place mechanisms and safeguards to address these impacts. The ESIA is to comply with the legal procedures of the project counterpart as well as the policy guidelines of the financing institutions.



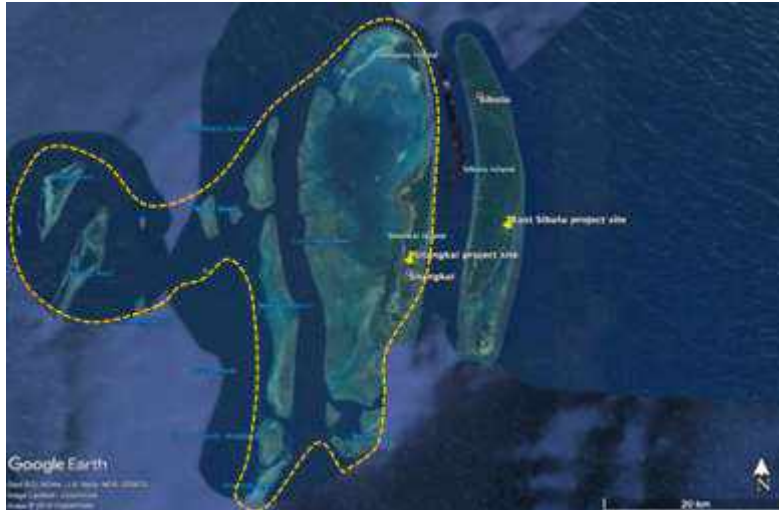


Figure 1.1. The location of the two island municipalities and its existing power source as captured and geotagged using Google Earth.

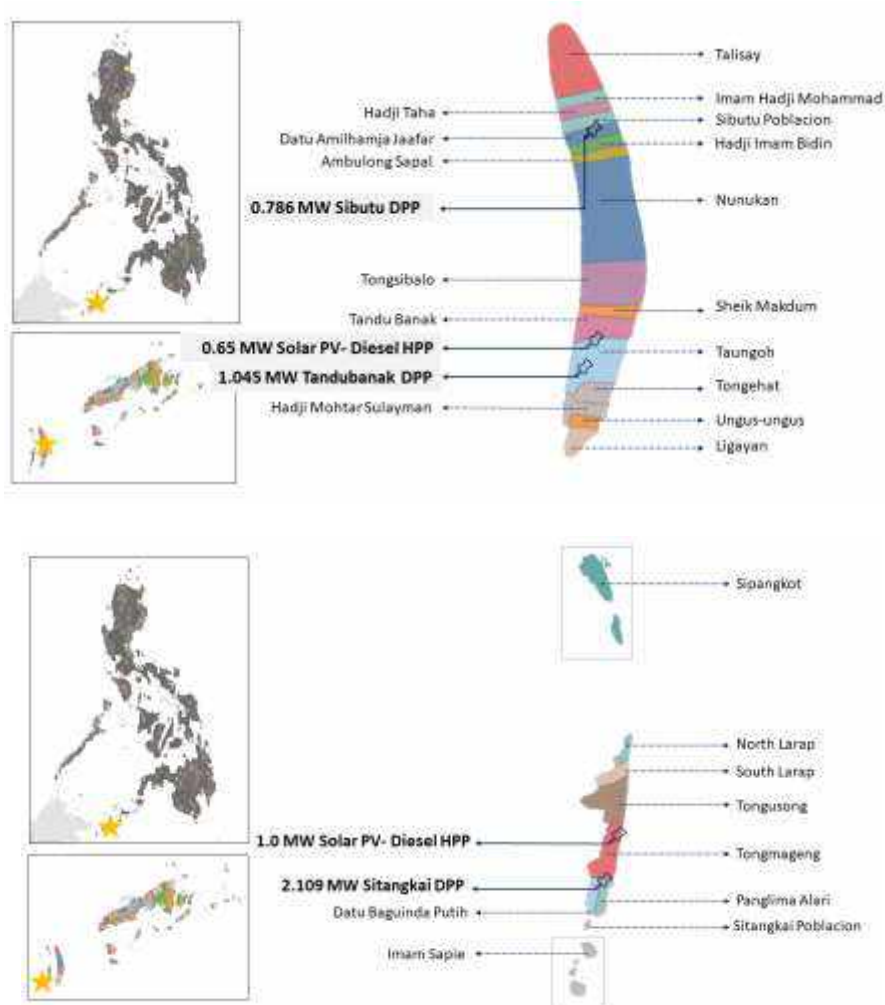


Figure 1.2. The geopolitical boundaries of Sibutu and Sitangkai Islands with the locations of its electricity generating plants.

The result of this work is the full report on the ESIA for Sibutu and Sitangkai Islands in Tawi-Tawi, Philippines. Specifically, this consists of a full report on the **Environmental and Social Impact Assessment for the development and rehabilitation of water supply, improvement of rainwater harvesting and sanitation systems in both islands**. The report is prepared in compliance with the guidelines and regulations of the following:

- National laws and/or regulations on environmental reviews and impact assessments;
- Environmental policy of the Philippines and the Bangsamoro Autonomous Region of Muslim Mindanao (BARMM), where Tawi-Tawi belongs, and the related documents;
- Environmental assessment regulations of the Adaption Fund; and
- Environmental assessment regulations of UNIDO.

### 1.5 Scope of Work

The major focus of the Environmental Impact Assessment (EIA) study contains a detailed description of the project focusing on aspects that could potentially have an impact on the physical and biological environment. It is directed to the water and wastewater standards and environmental assessment including marine environment impacts, land impacts, water quality impacts, noise impacts, solid waste, and economic impacts at different phases of project development such as:

- **Pre- and Construction activities:** land clearing and site preparation; construction of access routes; construction of infrastructure (e.g., desalination facility with 1.0 MWp solar PV power plant and auxiliary units, rehabilitation of existing wells for domestic purposes, water supply and distribution networks, demonstration pilots of communal rainwater catchment and improved sanitation systems), workshops, and other necessary common facilities and related facilities of water supply systems; and
- **Post-construction or operational activities:** maintenance of water supply and distribution systems and desalination plant (with special focus on wastewater discharge and process waste).

On the other hand, the major focus of the Social Impact Assessment (SIA) study contains the description of the project focusing on those aspects that could potentially have an impact on the social environment. It is directed to the socio-economic impacts at different phases of water supply system with treatment facility development, as follows:

- **Pre-construction activities:** relocation of housing that may be displaced from the facility territory or otherwise displaced by the project;
- **Construction activities:** land clearing and site preparation; construction of access routes; construction of infrastructures, commercial and social facilities, workshops, warehouses, and other necessary common facilities and related facilities; and
- **Post-construction or operational activities:** impounding, filling, and maintenance of the facility areas as well as operation and maintenance of the developed and or rehabilitated infrastructures and collection centers, etc.

### 1.6 Methodologies and Approaches

**Scoping, Surveys, and Consultation,** involving the local, municipal, and provincial government units and the island communities. The activities include public consultations, key informant interviews, focus group discussions, and surveys on households and direct stakeholders of the project.

**Data Collection and Analysis,** which cover noise impact assessment, air quality impact assessment, wastewater effluent assessment, solid waste assessment, site location and local conditions, and the proposed environmental and social monitoring protocols. Socio-economic issues, which include social impacts, which can affect the local population in the construction and operation of the water treatment facility (e.g., desalination, chlorination, etc), in the process of land acquisition for the development of the infrastructure and employment situations in the process, are investigated. Studies on the potential impacts also consider the 3 phases of pre-construction, construction, and post-construction activities, where socio-economic impact monitoring is also proposed.

**Report Preparation.** The report preparation includes the inception and site reconnaissance report, baseline data analysis, scoping, surveys, on-site visits, interviews impact identification and prediction, mitigation management, social monitoring, and public consultation process. This also includes the ESIA Final Report with the relevant annexes and information. ESIA reports follow the templates and guidelines as required by national law and funding agencies.

### 1.7 Study Activities

The following activities were facilitated and implemented with the ESIA:

1. integration of a specialized team of experts required to undertake the ESIA study;
2. the conduct of visits, with a team of experts, to the sites for carrying out site reconnaissance and data collection, in conjunction with the concerned authorities;
3. the conduct, using a specialized team of experts, several baseline studies, covering all spectrum of analysis relevant to the construction and operation of potable water supply and distribution system with filtration and disinfection units, the desalination facility

- including water supply system, powered by 1.0 MWp solar PV power plant, improved rainwater harvesting and the sanitary systems;
4. assessment of the environmental and social impacts of the construction and operation activities;
  5. development of an environmental and social management and monitoring plan to manage these impacts; and
  6. compile, edit and prepare for final print a Final Environmental and Social Impact Assessment (ESIA) Report containing standardized parts of the study Report for Sibutu and Sitangkai Islands in Tawi-Tawi, Philippines.

### 1.8 Project Proponents and ESIA Consultants

The United Nations Industrial Development Organization (UNIDO) as the main project proponent plans to implement the project with grant assistance from the Adaptation Fund. The Philippine government fully supports the project through the Bangsamoro Autonomous Region of Muslim Mindanao (BARMM), Mindanao Development Authority (MinDA) as the executing partner, and the Province of Tawi-Tawi. Technical assistance was provided by a team of experts in the preparation of this ESIA study to address environmental and social safeguard issues documented in this report.

### 1.9 This ESIA Report

This ESIA Report is prepared for the **development and rehabilitation of potable water supply and distribution system and improvement of rainwater harvesting and sanitation systems in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines**. The document is prepared based on the ESIA guidelines provided by UNIDO and Adaptation Fund and as defined in the Terms of Reference (TOR). This is outlined considering the latest and applicable national laws and environmental legislations of the Republic of the Philippines and the Bangsamoro Autonomous Region of Muslim Mindanao (BARMM); and that of the international laws applicable to the project, for an environmental impact assessment study. This aims to provide guidance for the project implementer, which includes the necessary environmental, and social management measures.

The document contains the policy, legal, and regulatory framework, details of the proposed project components, baseline environmental and social data, potential environmental and social impacts of the project and their mitigation measures. It also introduces the environmental management measures, environmental management plan (EMP), social management plan (SMP), and the responsibilities of the environmental specialists/experts of the project implementer as well as the methods and results of the community engagement process during the different stages of the project planning, which can be updated during the implementation phase. A Grievance Management Mechanism (GMM) is also included as part of the environmental and social safety and safeguard measures for the project based on UNIDO and Adaptation Fund policies and regulations.

## 2. POLICY LEGISLATIVE, REGULATORY, AND ADMINISTRATIVE CONSIDERATIONS

### 2.1 National Laws and Regulations

The following presents the relevant laws and regulations covering the scope of developing and rehabilitating a potable water supply system with filtration and disinfection units, a desalination facility for potable water supply and distribution, and the improvement of rainwater harvesting and sanitation systems in Sibutu and Sitangkai Islands.<sup>1</sup>

- Environmental Impact Assessment Law (PD 1586)
- Philippine Clean Water Act of 2004 (RA 9275)
- Sanitation Code of the Philippines (PD 856)
- Ecological Solid Waste Management Act (RA 9003)
- Toxic Substances and Hazardous Waste Management Act (RA 6969)
- Environmental Awareness and Education Act of 2009 (RA 9512)
- Clean Air Act of 1999 (RA 8749)

**Presidential Decree (PD) 1586: Environmental Impact Assessment Law.** This project is required to undergo an Environmental Impact Assessment (EIA) by virtue of Presidential Decree (PD) 1586 of 1978, otherwise known as the Philippine Environmental Impact Statement System (PEISS). An approved Environmental Compliance Certificate (ECC) or its equivalent (such as the Certificate of Non-

---

<sup>1</sup> <https://emb.gov.ph/laws-and-policies-3/>

Compliance or CNC) as appropriate, must be issued by the Department of Environment and Natural Resources (DENR), and in the case of BARMM where the study site belongs, by the Ministry of Environment and Natural Resources and Energy (MENRE), which still follows the PEISS. According to the updated guidelines in the Environmental Management Bureau Memorandum Circular No. 2014-005 (EMB MC 2014-005) or the Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS, the project is under **Category B (3.1.3. Water Supply Projects with Water Source and Treatment including desalination, reverse osmosis, others)**, classified as **Non-Environmentally Critical Project (Non-ECP)**.<sup>2</sup> As such, the project is required an Environmental Impact Statement (EIS). The integration of a 1.0 MWp Solar PV power facility falls under **Category D (3.2.7. Renewable energy projects with ≤ 5 MW total power capacity)**, classified as **Non-Environmentally Critical Project (Non-ECP)**, which is not covered and may only secure a Certificate of Non-Compliance (CNC).<sup>3</sup> Overall, this project seeks to clinch the approval of the ECC under Category B (Non-ECP).

**Republic Act 9275: Philippine Clean Water Act of 2004.** This is an Act providing for a comprehensive water quality management system in the Philippines. Among its policies, the Act requires the formulation of a holistic national program of water quality management that recognizes that its issues cannot be separate from concerns about water sources and ecological protection, water supply, public health, and quality of life (Section 2c). Further, it mandates the LGUs to have the shared responsibility in the management and improvement of water quality within their territorial jurisdictions. In addition, it mandates the DPWH to formulate and implement the national sewerage and septage management program (Section 7) and tasked the LGUs to implement the program, including sewage collection, treatment, and disposal (Section 8) in their respective jurisdictions.

**Presidential Decree (PD) 856 of 1976: Sanitation Code of the Philippines.** As amended and modified by the Philippine Clean Water Act (RA 9275) described above, this covers the national sanitation management program, whereby LGUs shared the responsibility of ensuring the implementation and enforcement of the domestic water, sanitation, and hygiene (WASH) programs in their respective jurisdictions.

**Republic Act 9003 of 2000: Ecological Solid Waste Management Act.** This is an Act providing for an ecological solid waste management program, which set the guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures, including composting, recycling, reuse, recovery, and others, before collection, treatment, and disposal in appropriate and environmentally-sound solid waste management facilities in accordance with ecologically sustainable development principles (Section 2c). Further, it mandates the LGUs to be primarily responsible for the implementation and enforcement of the holistic solid waste management and the rest of the relevant provisions of the Act within their respective jurisdictions (Section 10).

The rest of the relevant laws such as the **Toxic Substances and Hazardous Waste Management Act (RA 6969)**, **Environmental Awareness and Education Act of 2009 (RA 9512)**, and **Clean Air Act of 1999 (RA 8749)**, are also very clear in delineating the guidelines and regulations covering subject matters as applicable to this proposed project, whereby LGUs have shared responsibilities in implementing and enforcing such laws within their jurisdictions.

**Other Relevant Laws and Regulations.** Aside from PD 1586 and EMB MC 2014-005, other local environmental laws, standards, and regulations that are relevant to the project are:

- DENR Administrative Order No. (DAO) 2016-08: Water Quality Guidelines (WQG) and General Effluent Standards (GES)
- DAO 2021-19: Updated Water Quality Guidelines (WQG) and General Effluent Standards (GES) for Selected Parameters
- DAO 2017-11: Updated National List of Threatened Philippine Plants and their Categories
- DAO 2019-09: Updated List of Threatened Philippine Fauna and their Categories
- DAO 2000-81: Implementing Rules and Regulations for RA 8749
- DAO 2017-15: Disclosure and Participation Aspects in PEISS
- PD 984: Pollution Control Law
- PD 442: Labor Code of the Philippines

In addition, the **Philippine Renewable Energy Act of 2008**, also known as **Republic Act 9513**, promotes the development, utilization, and commercialization of renewable energy resources, in order to accelerate the exploration and development of the renewable energy sector in the Philippines. This

---

<sup>2</sup> DENR Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS, p 23.

<sup>3</sup> Ibid, p 24.

mandates that whenever possible, renewable energy resources must be used in public facilities such as covered in this project. Thus, the project proposes to install a 1.0 MWp solar PV power facility to energize the desalination facility and to use solar energy to power auxiliary equipment such as water pumps and other gadgets for improved water supply and distribution.

## 2.2 Relevant International Legislation and Environmental Assessment Regulations

The Adaptation Fund (AF) as funding agency and UNIDO as the project proponent require the conduct of environmental assessment of projects such as covered in this study. Specifically, the AF Board defined its latest Environmental and Social Policy (AF ESIA Amended March 2016 OPG Annex 3 ESP) and likewise UNIDO AI.2021.03 specifies the latest Administrative Instruction on its Environmental and Social Safeguards Policies and Procedures (ESSPP). The ESIA study has been prepared in accordance with these policy guidelines and requirements on environmental and social safeguards.

## 2.3 Other Multilateral Environmental Agreements (MEAs)

In addition to local and other relevant laws and regulations, the following conventions, protocols, and regional agreements, also referred to as MEAs<sup>4</sup> are relevant to the Philippines, and the context of this proposed project:

- Rotterdam Convention, which facilitates informed decision-making by countries in trading hazardous chemicals;
- Stockholm Convention, which aims to protect human health and the environment from the effects of persistent organic pollutants (POPs);
- Basel Convention, which regulates the transboundary movements of hazardous wastes and to ensure that such wastes are managed and disposed of in an environmentally sound manner;
- APEC Chemical Dialogue, which facilitates risk reduction and sound management of chemicals in the APEC region and share knowledge and information on chemicals management;
- Vienna Convention for the Protection of the Ozone
- Minamata Convention on Mercury
- Montreal Protocol on Substances That Deplete the Ozone Layer
- Acid Deposition Monitoring Network in East Asia
- Asia Pacific Mercury Monitoring Network
- ASEAN Working Group on Environmentally Sustainable Cities
- ASEAN Working Group on Chemicals and Waste
- ASEAN Working Group on Environmental Education
- ASEAN Working Group of Water Resources Management
- ASEAN Working Group on Coastal and Marine Environment
- ASEAN Working Group on Nature Conservation and Biodiversity
- ASEAN Working Group on Climate Change

## 2.4 Water Quality

In accordance with the Philippine National Standards for Drinking Water, the chemical, physical and microbiological properties are essential components in the assessment of water quality. The existing water resources in Sibutu and Sitangkai Islands need to be maintained to keep the water quality at its acceptable standards.

### 2.4.1 Physical and Chemical parameters

The Philippines National Standards for Drinking Water 2007 (PNSDW-2007) provides the minimum standards for quality of potable water.<sup>5</sup> Per PNSDW-2007, drinking water must be clear, colorless, and free from objectionable taste and odor. **Table 2.1** presents the PNSDW standards for physical and chemical quality. All other standard values are contained in the PNSDW Administrative Order No. 2007-0012, or any other standards more recently issued by the Department of Health.

---

<sup>4</sup> <https://emb.gov.ph/international-agreements-3/>

<sup>5</sup> Philippine National Standards for Drinking Water 2007.



**Table 2.1. Standard values for physical and chemical qualities of drinking water**

Constituent	Maximum level(mg/l) or Characteristic	Remarks	Method of analysis
Taste	No objectionable taste	The cause of taste must be determined.	Sensory Evaluation
Odor	No objectionable odor	The cause of odor must be determined.	Sensory Evaluation
Color True: Apparent:	5 NTU 10 NTU	Decomposition of organic materials such as leaves, or woods usually yield coloring substances to water	Visual Comparison; Colorimetry Method
pH	6.5-8.5 (5-7 for product water that has undergone reverse osmosis or distillation)	The acceptable range may be broader in the absence of a distribution system.	Electrometric method
Turbidity	5 NTU	Turbidity increases with the quantity of suspended matters in water	Turbidimetry
Aluminum	0.2 mg/l	Aluminum sulfate is used in water treatment as a coagulant.	FAAS, EAAS. ICP, Colorimetry Method
Chloride	250 mg/l	Chloride in drinking water originates from natural sources, sewage and industrial effluents, urban runoff, and seawater intrusion	Argentometric Method, 1C
Hardness	300 as CaCO <sub>3</sub>	Hardness is due to the presence of naturally occurring divalent cations, resulting from contact of acidic groundwater with limestone and dolomites.	FAAS, EAAS. ICP, Colorimetry Method
Hydrogen Sulfide	0.05 mg/l	Hydrogen sulfide is a common nuisance contaminant. Although not hazardous to health, the offensive odor and corrosiveness of water containing hydrogen sulfide make treatment necessary.	Methylene Blue Method, Iodometric Method
Iron	1.0 mg/l	Iron is found in natural fresh waters. It may be present in drinking water because of the use of iron coagulants or the corrosion of steel and cast-iron pipes during water distribution.	Phenanthroline, AAS, ICP, Colorimetric Method
Manganese Persulfate	0.4 mg/l	Manganese occurs naturally in many surface and groundwater sources, particularly in anaerobic or low oxidation conditions.	Method, AAS, ICP, ICP/MS
Sodium	200 mg/l	Sodium is usually associated with chloride; thus, it may have the same sources in drinking water as chloride.	AAS (Flame absorption mode), ICP/MS, Flame
Sulfate	250 mg/l	High levels of sulfate occur naturally in groundwater	Turbidimetric Method, Ion Chromatography, Gravimetric Method
Total Dissolved Solids (TDS)	500 (but < 10 for water product that has undergone reverse osmosis/distillation process)	TDS in drinking water originate from natural sources, sewage, urban runoff, and industrial wastewater	Gravimetric, dried at 180°C
Zinc	5.0	Zinc may occur naturally in groundwater. Concentration in tap water can be much higher because of dissolution of zinc from pipes.	FAAS, ICP, ICP/MS

#### 2.4.2 Microbiological parameters

Drinking water should be free of pathogenic microorganisms. It should not contain bacteria that indicate fecal pollution, of which coliform bacteria are the primary indicator as it is found in the feces of warm-blooded organisms and humans. Parasitic protozoa and helminths are also indicators of water quality. Species of protozoa can be introduced into the water supply through human or animal fecal contamination. Most common among the pathogenic protozoans are *Entamoeba* and *Giardia*. Where possible, only water sources that are not likely to be contaminated by fecal matter should be used.

### 3. ANALYSIS OF ALTERNATIVES TO THE PROPOSED PROJECT

#### 3.1.1 Current Situation and the Need for Potable Water Supply

Water and energy are two basic components of life and most often scarce in small island communities such as Sibutu and Sitangkai Islands, located in Tawi-Tawi, Philippines. In optimization studies involving energy and water, the typical approach is to make use of electricity to supply the daily load demand of consumers while also integrating water treatment facilities to supply their water requirements. The interconnections between water and energy have become an emerging strategy to address sustainability considering that water is needed to produce energy and energy is likewise needed to source, treat, and distribute water. This sits well with the proposed project where the end-goal is to contribute meaningfully to the UN SDG 6 targets on Clean Water and Sanitation and support the SDG 7 on Affordable and Clean Energy for All.

Based on recent and prior study [15], local communities in Sibutu and Sitangkai Islands experience serious water scarcity, as all water sources are either untreated or brackish. All of them are relying heavily on rainwater collection and water sources from shallow/dug/bore wells located around the islands, even when these are already brackish in the case of Sitangkai. The average current water demand in Sibutu and Sitangkai is 153 and 235 m<sup>3</sup> per day, respectively, where only 96.8 m<sup>3</sup> for Sibutu and 90.6 m<sup>3</sup> for Sitangkai is used for drinking (and cooking). This means that the average daily per capita consumption is 4.31-6.05 liters for all uses and 2.33-2.77 liters for drinking (and cooking) for both islands. These figures are much lower (less than 7%) of the standard requirements for households as defined by a World Bank study on the basic needs of the urban poor, which is estimated to be at 100-110 liters per capita per day. This seriously indicates that the island folks are severely deprived of clean and potable water, and are seriously suffering from dehydration, malnutrition, continued lack of potable water, leading to poor health conditions.

Secondly, almost all of the households in Sibutu and Sitangkai Islands, rely on untreated rainwater for drinking and cooking; the water supply from shallow/dug/bore wells are also untreated, which endangers public health and sanitation in the communities. Further, due to this water scarcity, majority of the island dwellers (about 70%), especially those living in coastal areas with houses built on stilts, still have poor sanitation and hygiene practices, which are manifested by open defecation and direct disposal of wastes into the sea. In addition, solid wastes are also directly disposed of into the open sea as evidenced by the alarming presence of plastic litter and other non-biodegradable trash along the coasts and seashores.

Majority of the local folks rely on seaweed farming and fishing as their source of income. With water scarcity, the **water demand for seaweed farming** and its post-harvest processing, is neither addressed adequately as well. Coupled with poor sanitation, hygiene and solid waste management, the seaweed farms are crucially affected as manifested by the poor quality and low productivity of seaweeds. This exacerbates the already challenging socio-economic conditions of the island communities.

#### 3.1.2 Analysis of Alternatives and Its Environmental and Social Impact

The alternative and supplementary water resources of Sibutu and Sitangkai Islands were assessed and reported in detail in previous study [15], including current practices and issues on sanitation and hygiene; and the report also included the environmental and socio-economic implications. The water resources were revisited again during the recent scoping mission on December 5-16, 2022, in these islands. These water sources include existing shallow, dug, and bore wells (untreated or still brackish), rainwater catchment, the existence of water retailers for purified drinking water, and the import of pure bottled drinking water from elsewhere (outside the islands). The following conclusions during the assessment activities are put forward as follows:

- Existing water sources from shallow, dug, and bore wells are mostly unprotected, in dire state (broken, not functional, not operational), are untreated (not filtered nor disinfected,) brackish, and lack proper maintenance. In its vicinities, impurities and leaked/excess fuel from generators are often detected, where this is used in pumping water to storage tanks. Even at brackish conditions in the case of Sitangkai wells, the water sources are vulnerable to contamination, and water pipelines are susceptible to other nefarious circumstances and incidents like thief, vandalism, and disputes.
- Where available, water pumps are powered by diesel- or gasoline-fired generators, which operate on a part-time basis (4-8 hours daily and 2-3 times weekly) and are heavily dependent

on continued budgetary support from the local government units (e.g., barangays), which oftentimes run out, causing water supply shortage for indefinite periods of time.

- Bulk water importation is extremely expensive especially those bottled, processed, and purified (via filtration and reverse osmosis done by water purifying and refilling stations).
- Rainwater is untreated, its catchment is very basic and rudimentary, and is mostly constrained by vulnerability to prolonged drought, shortage of roofing space, exposure to dirt and contaminants from animals, rodents, birds, and others.
- Water storage tanks are also basic, often rudimentary, and not well-maintained.
- Water recycling is not a regular practice and wherever it is done, it is limited in scope and process, which is usually carried out by households. However, seawater or brackish water (from nearby wells) is often used for cleaning and other domestic purposes.
- The construction of community- or island-wide ground water supply system is capital intensive, especially the deep wells, and would potentially pose several unintentional environmental problems which need appropriate mitigation (such as those related to site selection, sources and use of materials, generation of excessive noise, pollutants, severe salt intrusion, and others).
- The islands have no water management system which can take care of the water issues and the sustainability of the water resources in the long-term.
- Majority of the island communities, especially those living in coastal areas with houses built on stilts, commonly practice open defecation and or direct disposal of sewage into the sea. Common toilets in these communities are of hanging latrine type, with no catchment and pipelines, and are often not connected to septic tanks.
- There is no community- or island-wide sewage and septage collection, treatment, and disposal system.

With these current conditions, the negative environmental and social impacts are clearly expressed from the assessments made. The alternatives are then explored based on these conditions and are discussed and presented in order to ascertain a selection of promising ones, which can serve as basis for consideration in the proposed project.

**Table 3.1. Alternative processes for water treatment and supply for small island application**

Alternatives	Criteria for Selection			
	Costs	Water purity & yield	Environmental impact	Ease of implementation, safety of operation
<b>Freshwater sources</b>				
Rainwater	Negligible	Good, may need filtration and disinfection	No negative impact	Easy and relatively safe; need to clean the catchment regularly
Groundwater	Incur energy costs for pumping	Very good, needs filtration and disinfection; high water yield	Over-extraction may lead to saltwater intrusion of groundwater sources; require long-term hydrological studies & monitoring	Easy and relatively safe; need to provide clean storage tanks; wells need protection from contaminants, regular cleaning and monitoring
Desalinated water	High energy & capital costs	Very good, water yield is lower depending on technology	Concentrated brine solution is a by-product, needs further handling and treatment	Complex operation, need technical knowhow, requires regular operation and maintenance
<b>Rain Water Harvesting Systems (RWHS)</b>				
Independent/Individual RWHS for each house	Costly, require storage tanks, good piping system	Good, may need filtration and disinfection	No negative impact	Easy and relatively safe; need to clean the catchment & roofing regularly
Communal RWHS for a group of neighboring houses	Costs of storage tanks and piping can be shared	Higher water yield, may need filtration and disinfection	No negative impact	Easy and relatively safe; need to clean the catchment & roofing regularly; shared responsibility by the group of households
<b>Treatment of Groundwater or Rainwater</b>				

Alternatives	Criteria for Selection			
	Costs	Water purity & yield	Environmental impact	Ease of implementation, safety of operation
Mechanical, simple sieve or filter, may use pumps	Less costly	Good yield and purity	No negative impact; may use renewable energy for pumps to avoid GHG emissions	Easy and relatively safe; need to clean the catchment & roofing regularly in order to avoid contaminants
Disinfection by simple chlorination	Costly, require chlorine	Very good purity and yield, may have excess chlorine	No negative impact	Easy and relatively safe; need to learn the preparation of correct chlorine dosage and its application procedures
Disinfection by UV light	Costly, require UV light	Very good purity and yield, no impurities	No negative impact	Easy and relatively safe; need to learn how to operate UV-light system
Desalination Techniques				
Membrane separation: SeaWater Reverse Osmosis (SWRO)	High energy & capital costs; renewable energy (RE) use is feasible	Very good, water yield is higher (about 60%)	Concentrated brine solution is a by-product, needs further handling and treatment	Complex operation, need professional expertise, requires regular operation and maintenance; most commonly used, well-established commercialized technology
Membrane separation: SeaWater Forward Osmosis (SWFO), Electrodialysis (ED)	High energy & capital costs	Very good, water yield is lower	Concentrated brine solution is a by-product, needs further handling and treatment	Complex operation, need professional expertise, requires regular operation and maintenance; not yet fully ready for community use
Thermal distillation: Multi-stage flash (MSF), Multi-effect distillation (MED), vapor compression (VC), freezing (FRZ)	Costly, energy-intensive; may increase GHG emissions with fossil fuel use	Good quality water, low water yield	Concentrated brine solution is a by-product, needs further handling and treatment	Complex operation, needs technical knowhow, requires long hours of operation and maintenance; requires regular operation and maintenance; not yet fully ready for community use

### 3.1.3 The “No Project” Option

Under the “No Project” option, the community folks of Sibutu and Sitangkai Islands will continue to experience scarcity of water supply and suffer from untreated drinking water sources. This exacerbates the continued poor sanitation and hygiene practices due to water inadequacy and lack of appropriate water and sanitation infrastructure. It is recently reported that the BARMM region, where these islands belong, still has acute watery diarrhea as the prevailing number one disease causing morbidity in 2021 (see Annex E for more details). Under such conditions, the majority of the households in the islands, particularly those living in coastal areas having houses built on stilts, will continue to practice open defecation and direct disposal of sewage to the open sea. This directly impacts public health due to poor sanitation which may aggravate water-borne diseases, malnutrition, dehydration, and onslaught of other diseases due to poor health. Further, poor sanitation and hygiene as well as improper solid waste management negatively affects the environmental and ecological balance of the islands and its surrounding seas and oceans, where the local communities derive their major livelihood which is seaweed farming and fishing. This austere cycle of bleak and misery will continue without the outside, serious, and targeted interventions.

## 4. DESCRIPTION OF PROPOSED PROJECT AND JUSTIFICATION

### 4.1 General description of project

The previous study [15] and the prior sections of this work (**Chapters 1-3**) recognize the magnitude of the negative impact attributed by the limited water resources, its associated health and sanitation issues exacerbated by poor solid wastes management, and its socio-economic concerns

linked to seaweed farming and fishing as the major livelihood, in the communities of Sibutu and Sitangkai Islands, located in Tawi-Tawi, Philippines.

The proposed project includes the development and rehabilitation of the water supply and distribution system facility in Sibutu, the development of desalination facility powered by solar energy in Sitangkai, and the improvement of rainwater catchment and sanitation systems in both islands. The project is committed to supplement existing water shortages by undertaking water treatment and distribution infrastructure development and enhancement, improving public health by providing clean, safe, and potable water, and offering appropriate pilot sanitation and hygiene systems in groups of households and communities, particularly those living on stilt houses in coastal areas, in both islands. The project manifests the complex water issues in both islands and employs a combination of approaches to improve water supply and distribution, reduce water leakages and wastage, and enhance rainwater harvesting systems as an important alternative to tapping and supplementing freshwater resources. Coupled to these actions are the institutional strengthening and behavioral change programs through awareness and educational activities to ensure sustained efforts.

The project is mainly composed of the (1) development and rehabilitation of physical infrastructures and (2) institutional strengthening and behavioral change through the implementation of IWRM, educational and awareness programs on water, sanitation, and health (WASH), and proper solid waste management system. The following components of the project are:

- rehabilitation of the potable water supply system in Sibutu and development of a 1,000 cubic meter per day (CMD) desalination facility powered by 1.0 MWp solar PV system in Sitangkai, improvement of the water quality and supply services, including rehabilitation of current water sources (e.g., shallow/deep/bore wells), water treatment by filtration and disinfection for the existing wells where necessary and appropriate, expansion and modernization of water supply network, and access to solar photovoltaic power plant and or installation of independent solar-powered pumps and gadgets, where needed;
- demonstration of appropriate pilot systems for sanitation and water resource management such as rainwater harvesting systems;
- Institutional strengthening and project management, including support, technical assistance, training and workshops, and establishment of a municipality-wide water district as a formal water service provider;
- Water, sanitation and hygiene (WASH) and solid waste management (SWM) awareness and educational programs; and
- Project management.

The **main outcomes of the project** will be:

- To improve access to clean, safe, reliable, adequate potable water supply services in Sibutu and Sitangkai Islands;
- To improve health, water, sanitation, and hygiene practices of the local communities;
- To increase resilience of the water services and waste management system to climate change;
- To enhance the operational efficiency and financial viability of the water supply service facility, in support of the climate-resilient approaches to better seaweed farming and productivity, which should sustain the livelihood and economic outputs of the communities.

## 4.2 Details of the project

### 4.2.1 Project location and general accessibility

**Figure 4.1** shows the general project locations in Sibutu and Sitangkai Islands, located in Tawi-Tawi, Southern Philippines while **Figure 4.2** shows the accessibility map of the islands relative to the capital municipality of Bongao, which is the nearest point from the mainland of Tawi-Tawi province. The project is practically involving all the villages or barangays of both Sibutu and Sitangkai municipalities. The rehabilitation of the water supply system in Sibutu and the development of a common desalination facility in Sitangkai will be beneficial. While this effort is a suitable approach to manage its own local water sources, this also requires the project to have a holistic approach to institutional strengthening thru the direct involvement and full cooperation of the municipal officials. There is a felt need to centralize the project implementation by harmonizing and standardizing the local policy decisions in ensuring the sustainable management and operation of the water and sanitation facilities.



#### 4.2.2 Size, scope, capacity, design basis

The **potable water supply and distribution system** in Sibutu and Sitangkai Islands should meet the estimated water demand which is projected to consider an average standard consumption of 110 liters per capita per day for all purposes. At this rate, the current (year 2022) average water consumption in Sibutu and Sitangkai is 4,000 CMD and 4,281 CMD, respectively. This demand is projected considering the average increase in population in the islands.

Considering the population and existing water sources, the water demand of about 4,000 CMD in Sibutu can be supplied sufficiently from its groundwater sources, while the 4,281 CMD in Sitangkai can be appropriated thru the development of a desalination facility. In the meantime, the start-up and modular **installation of a 1,000 CMD desalination facility** in Sitangkai can only address the current drinking water needs of the households. Obviously, additional capacity is needed but due to its required large capital investment, a modular approach to the installation of scaleup desalination system is opted, where these additional capacities will be addressed phase-by-phase. Through the development of this initial 1,000 CMD desalination system and the rehabilitation of all its identified water sources, water needs can be addressed, especially prioritizing the clean and potable water. The institutional capacities will be developed and enhanced further through the establishment of a formal water service provider (water district) for each island municipality, which will also allow for a well-managed scaleup of the desalination system in Sitangkai; thereby, supporting and strengthening the overall water management system of the island.



Figure 4.1. General project location in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines

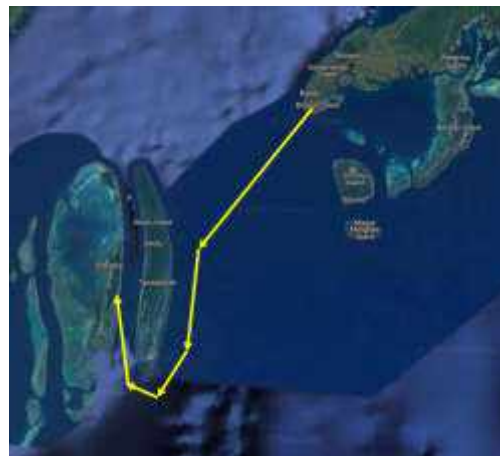


Figure 4.2. Accessibility map of the project sites in Sibutu and Sitangkai Islands from the capital municipality of Bongao, Tawi-Tawi, Philippines (Source: Google Map @2023)

**Design Basis.** Under the Philippine National Standards for Drinking Water (PNSDW) of 2017, all water supply facilities shall comply to these guidelines for a safe, clean, and potable water. **Table 4.1** shows the influent quality parameters as typical of ground water in the area and seawater (for Sitangkai desalination facility) and the desired drinking water standards. Actual measurements are needed to fine-tune the process parameters and achieve the water quality standards.



**Table 4.1. Water quality parameters and standards**

Parameters	Influent (feed) Groundwater	Influent (feed) Seawater	Drinking Water
Total Dissolved Solids (TDS)	500-700 mg/L	32,000 - 35,000 mg/L	< 600 mg/L
pH	6-7	7-8	6-7
Total Suspended Solids (TSS)	0-20 mg/L	100 mg/L	0 mg/L

### 4.2.3 Water treatment

**Water treatment by media filtration and disinfection by chlorination** are suitable, inexpensive, and easy-to-operate methods for water treatment of all water supply sources in Sibutu and Sitangkai Islands, including rainwater, which is deemed appropriate, to support other domestic needs. Moreover, a water storage and distribution system with a capacity of about 200-400 m<sup>3</sup> per day or more is proposed for a group of barangays or for a community cluster relative to the water sources and population.

An **integrated water resource management (IWRM) system** is proposed in both islands on a municipal level, under one municipality-based water service provider (water district) serving all barangays. Wherever possible, it is highly recommended to use the available renewable energy supply (Solar PV Power Plant) in Sibutu in powering up the water supply and distribution systems or independently install solar-powered pumps to rehabilitated water sources and storage/distribution tanks, especially those which are far from the power distribution lines.

#### 4.2.14 Process description of SWRO desalination system

The seawater reverse osmosis (SWRO) desalination system is usually an integrated membrane system using ultrafiltration (UF) as pretreatment to seawater reverse osmosis (RO) to produce 1,000 CMD of potable water. The system can be containerized or modular or mobile for quick and easy installation onsite. UF as pretreatment is preferred to produce stable feed water quality to RO which is the next step in the process (see **Figure 4.3** for the simplified process flow and Figure 4.4 for the schematic diagram of containerized or modular setups).

Seawater from the beach well or dug well is pumped into the UF container or module via intake pumps and dosed with hypochlorite (if required) to oxidize any organics. Coagulant is also feed inline (if required), then feed pumps which are fitted with variable frequency drives (VFD), will then feed the coagulated feed water into the UF modules for the removal of suspended solids, bacteria and other microscopic parasites like *Giardia* and *Cryptosporidium*. Prior to the ultrafiltration system, the raw water passes thru a bag filter with 200-micron rating to remove solids higher than 200-micron. Then the filtered effluent is sent into ultrafiltration modules. Ultrafiltration system is preferred over conventional filtration to provide 100% positive physical barrier to suspended particles, colloidal materials, algae, bacteria, viruses, and other pathogenic microscopic parasites. Other advantages of ultrafiltration (UF) over conventional filtration are that it will produce consistent turbidity even during varying feed quality or high turbidity feed, which can happen during upset conditions. UF also removes particles/colloids as low as 0.08 micron unlike media filters that have low removal efficiency of particles less than 15 microns. UF eliminates the possibility of breakthrough during filter backwash and carry-over of high concentration of colloidal particles. Ultrafiltration modules are specially designed for municipal drinking, industrial and wastewater processing applications. These modules can be <0.08-0.1 micron rated PVDF (polyvinylidene fluoride), hollow fiber membrane technology that support high and stable flux rates and constructed with advanced bonding techniques for an exceptionally strong module design.

**Ultrafiltration (UF) System.** The following components included in the ultrafiltration system (UF) are feed water and reverse flush (RF) tank, feed and reverse flush pumps, refurbished hollow-fiber membrane modules and the instrumentation and control system. The UF configuration usually requires less operator intervention as most of the functions are automatically controlled. The scheme may include less process steps to achieve the target quality desired. Due to less process steps and automation provided, the system could tolerate minor fluctuations in the incoming grey water feed including total suspended solids (TSS), turbidity, etc.

The filtrate from the UF system is then pumped into the SWRO container or module. The SWRO containerized or modularized plant is designed to produce up to 1,000 CMD (264,000 US gallons per day) of potable water at a recovery of 40-45%. The UF filtered seawater is then passed thru a 5-micron cartridge filter to remove suspended solids that may have been reintroduced at the feed tank, as a last line of defense of the seawater membranes. The cartridge filter vessel also aids in providing complete mixing of the chemically treated water.

Sodium metabisulfite solution is then injected into the raw water primarily to remove chlorine and any oxidizing agents in the water, and to additionally act as a bacteriostat, by inhibiting the growth of algae and other organisms. ORP (oxygen reduction potential) meter should be provided and shall be located downstream of the cartridge filters. When chlorine is detected by the ORP meter, the plant will shut down automatically to protect the membranes. Scale-inhibitor is added to the raw water to inhibit the precipitation or formation of sparingly soluble salts within the reverse osmosis unit.

The high-pressure pump feed the filtered and chemically treated sea water to the reverse osmosis membranes at high pressure 55-68 Bar (800 to 1000 psi). When seawater at high pressure is fed to the RO membrane, almost pure water or permeate passes through the membrane while salts are retained in the concentrate side. The permeate from the RO unit is collected in a common manifold. The permeate is usually slightly acidic and corrosive. The permeate must be post treated (by others) with soda ash, lime, or caustic soda solution to adjust/increase the pH and reduce the corrosiveness of the product water. Sodium hypochlorite is also dosed (by others) into the product water to maintain a residual disinfection potential prior to distribution.

The dissolved salts not passed through the reverse osmosis membrane are concentrated on the feed/concentrate side of the membrane within the RO unit. The pressurized concentrate is then collected in a common manifold and is passed thru an energy recovery turbine (ERT) which will recover the pressure remaining in the concentrate and boost the final pressure of the feed water to the final membrane feed pressure. The ERT will reduce the energy consumption/requirement of the high-pressure pump by as much as 35%. The concentrate from the ERT is then sent to the brine outfall for disposal back to the ocean.

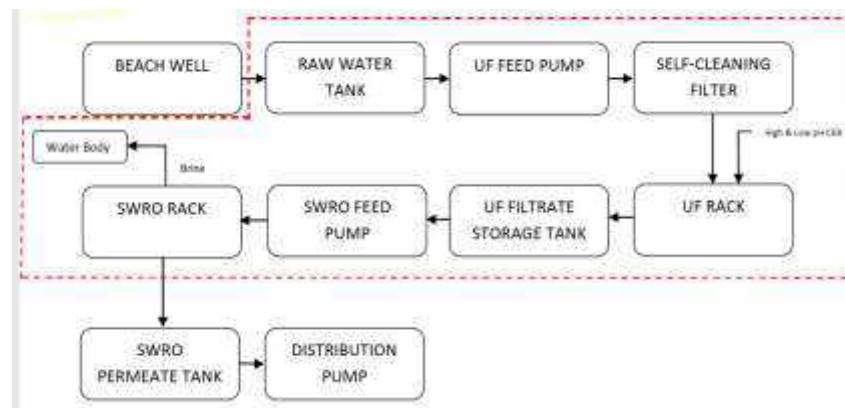


Figure 4.3. Simplified process flow diagram for SWRO desalination process

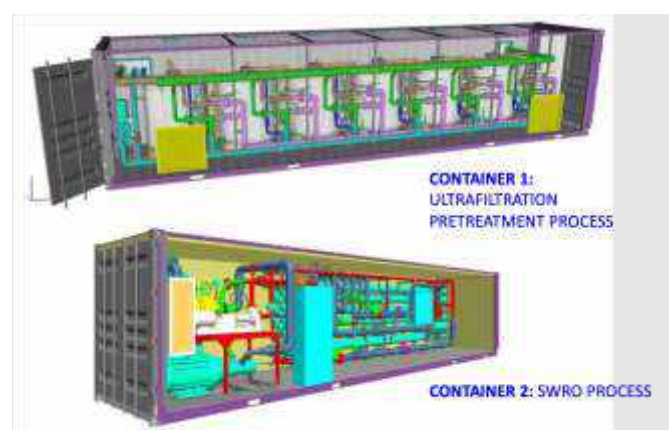


Figure 4.4. Simplified diagram for a containerized or modularized UF and SWRO systems

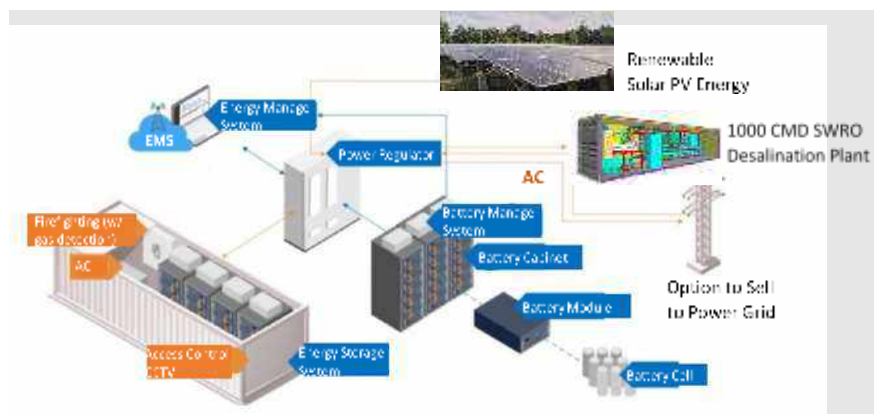
**Reverse Osmosis (RO) System.** The UF filtrate is pumped to a SWRO system to remove the dissolved solids and salts from the water. The SWRO system has cartridge filter for prevention of entry of bigger solids. It will be treated in a single pass RO system with designated number of RO membrane elements to produce 1,000 CMD with 40-45% recovery rate. An anti-scalant is dosed at feed header to prevent the membranes from scaling problems and to have longer RO life span.

**Effluent from seawater desalination.** Although desalination of seawater offers a range of human health, socio-economic, and environmental benefits by providing a seemingly unlimited, constant supply of high-quality drinking water without impairing natural freshwater ecosystems, concerns are raised due to potential negative impacts. These are mainly attributed to the concentrate and chemical discharges, which may impair coastal water quality and affect marine life [17], and air pollutant emissions attributed to the energy demand of the processes. The effluent salt concentrate is typically washed back into the sea by pipe dispersion through many ports or by nozzle jets, as the common industry practice. Impact of high salt concentrations in the effluent discharge is usually mitigated by dispersion or dilution of the brine to less than 1 ppt difference over small (<20m radius) area.

#### 4.2.4 Solar PV facility

The modular 1,000 CMD SWRO desalination facility is proposed to be powered by a **1 MWp solar PV power plant** to address its off-grid electricity demand using renewable energy resource and avoid GHG emissions. About 0.8-1.0 hectares of land is required for the ground-based PV solar array and accompanying capacity battery energy storage system (BESS) and other support facilities. Additional land requirement for solar PV may be allocated to provide for future energy needs. The system should be able to supply up to about 4.5 MWh solar energy and supply the electricity requirement of the SWRO desalination facility and its auxiliary units on a 24-hour basis. Excess energy, when there is any, can be supplied to the existing power grid. **Figure 4.5** shows an illustrative diagram of the complete system of an SWRO desalination facility powered by solar PV energy source.

**Energy storage system maintenance.** One of the main issues of the energy storage system is the cycle life of battery. Without any maintenance effort, the common cycle life of lithium-ion battery is up to 5000 cycles (with 80 percent depth of discharge), and the battery needs to be replaced. Thus, it is recommended to equip the system with Photovoltaic Energy Storage system, as it can provide “Battery Imbalance Recovery Service” for once every half year (every 500 cycles). With this service, battery life can be prolonged, thus can significantly reduce the cost for replacement.



**Figure 4.5.** Illustrative diagram of a solar PV energy system attached to the SWRO desalination plant

**Operation and Maintenance.** The solar PV plant will boost renewable energy generation. Its state-of-the-art control systems and batteries will ensure supply stability to the SWRO desalination facility by controlling the source of electricity as the solar PV system fluctuates and load changes. Reliability of renewable electricity supply is ensured and GHG emissions are avoided. The panels require routine washing with water but without chemicals. Rainfall runoff and wash water runoff from the structures will be concentrated along the down gradient edge and some may be retained for further use or discharged to ground to infiltrate into the freshwater lens. Even if panels were to crack or break, there are no liquid chemicals or gases or heavy metals that could pollute the soil or water.

The panels are preferably of ‘solid state’, mostly glass. The frames may be galvanized steel, and if so, they may leach zinc over a period of time, depending on the maintenance regime. The risk of batteries leaking or discharging heavy metals and other contaminants into the environment is low if they are well-maintained, retained securely within the purpose-built container-casing and support. Any leaks or spills in the containers should be quickly identified and cleaned up. Panels may be replaced or repaired during their working lifetime. End-of-life panels and batteries will be sent off-shore for recycling

and disposal. Panels or batteries that may still have some life, but are no longer suitable for the solar PV plant, will be repurposed and donated or sold for local reuse.

#### 4.2.5 Site development plan

The specific site location is adjacent to an existing Solar PV Power Plant in Tongmageng, Sitangkai. It is about 600 m East from the nearest settlement, 200 m South from the nearest mangrove forest, and 1.4 km West from the port in Barangay Tongmageng, Sitangkai. The site is recommended for the following practical reasons:

- a) The site has already an existing 1 MWp Solar PV facility, in which the proposed additional 1 MWp for the desalination facility is an expansion;
- b) The existing Solar PV facility can serve as a backup power supply, with the availability of its hybrid system;
- c) Excess power generation from the additional 1 MWp solar PV power plant for the desalination facility can be supplied to the power grid;
- d) It is near an identified ground water source in Tongmageng, Sitangkai, which is another potential source of feed water to the desalination facility. This will increase the quantity of the drinking water output due to the lower salinity of the groundwater source compared to seawater.

The schematic layout of the development site is shown in **Figure 4.6**. Three (3) possible sites of perimeter-fenced 1.0-1.2 ha are recommended in this study (*shown in yellow rectangle*). The solar PV system, composed of 1670-1820 monocrystalline PV panels, sits in a 0.8-1.0 ha of land (*shown in dark blue rectangle*). The rest of the facility includes solar inverters and battery storage systems in 20-footer containers, an office building and the containerized or modularized Ultrafiltration and SWRO desalination facilities. The entire project site will be permanently fenced, and the public will be excluded from site access. The project will attempt to keep the roads that are commonly used open and unobstructed throughout the construction period.

Site preparation will include removal of all vegetation which can obstruct the construction and operation phases. No earthworks or land contouring will be necessary unless the contractor finds old pits that require filling. If this happens then clean sand and or aggregates will be used to reduce the risk of groundwater contamination. Ground compaction is not necessary. Solar panels will be installed on poles or ballast-mounted structures using block foundations that sit above ground, rather than large underground foundations. This will limit the scale of earthworks and the demand for aggregates and will assist with site drainage by avoiding the penetration of the ground and the creation of hardstand or compacted areas. If poles, rather than concrete ballasts are selected for the solar PV panel frames, these may be installed using pole-drivers; the latter create a steady banging noise during operation which can be loud and will be a major source of noise on site. Other sources of noise emissions will be from vehicles. Ballast-mounted anchor blocks will be manufactured onsite.

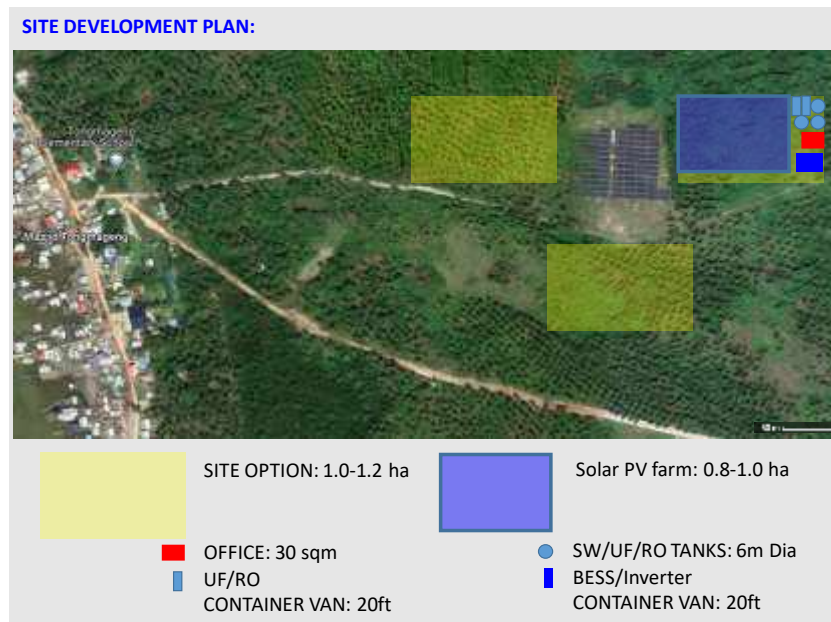
Minor works may be required to create preferential drainage paths and any other drainage features such as soak pits. There is unlikely to be any excess soil to manage but any small volumes of leftover soil will be used onsite where possible and otherwise stored or disposed as clean fill at a designated site on Tongmageng to be agreed with PMU and the local council. If additional fill is required, or sand is required for concrete mixing, then this will be from other construction projects on the island or from dredged sand from authorized sources.

Dust emissions may be possible during vegetation clearance in dry and windy periods until such time as vegetation has re-established. Emissions are likely to be low, due to the lack of ground disturbance and the lack of significant winds for most of the time in Barangay Tongmageng, Sitangkai.

The site is easily accessible by existing roads. Traffic will predominantly be staff travelling to and from the site. Light machinery will be mobilized to the site and removed at the end of the construction period. Transportation of construction material and equipment will be on flat bed or high-sided medium-sized trucks. Excess vegetation and or aggregates will be transported to a designated storage or disposal areas. The overall traffic movements for this project daily will be low and readily absorbed into the main road traffic but will be noticeable to people using the roads into and through the water reserve area.

Prior to and during the construction period an enrichment planting program will be implemented by the PMU and the local community. At the end of the construction period, temporary equipment and machinery will be removed, and work areas will be restored. All wastes will be removed and the vegetation under the solar panels established. Storm water systems may be installed to capture, treat and store, or discharge storm water to ground and should be operational. The site will be permanently fenced, security systems installed, and the facilities will be secured properly.





*Figure 4.6. Site development plan for the desalination facility with additional 1 MWp solar PV system*

#### 4.2.6 Pilot demonstration of communal rainwater catchment

Almost all of the households in Sibutu and Sitangkai Islands use rainwater for drinking and domestic purposes [15]. Improving the rainwater harvesting systems by demonstrating the communal designs can address this desire to have bigger water supply systems. In groups of households or communities where rainwater harvesting systems are inadequate and rudimentary (**Figure 4.7**), **demonstration pilots of suitably designed communal rainwater harvesting systems**, are implemented, **installed with simple treatment (filtration) and disinfection units**, and where stored rainwater can be shared by a cluster of households.

**Figure 4.8** shows a schematic diagram of a communal rainwater catchment, which may involve a cluster of 8-10 houses within 20-30 m radius, with average total roof area of about 1,200 sqm which can harvest about 15 cubic meters of rainwater, supplying about 2 days' worth of water per cluster. About 10 pilots may be done across all barangays, which target community-households built on stilts along the coastlines, canals, and foot bridges (**Figures 4.9-4.10**) and where water supply is scarce and far from the main sources, notwithstanding its brackishness. This will augment the water supply of the island and greatly supplement the water produced from the desalination facility.



*Figure 4.7. Examples of rudimentary rainwater harvesting systems in Sibutu and Sitangkai*

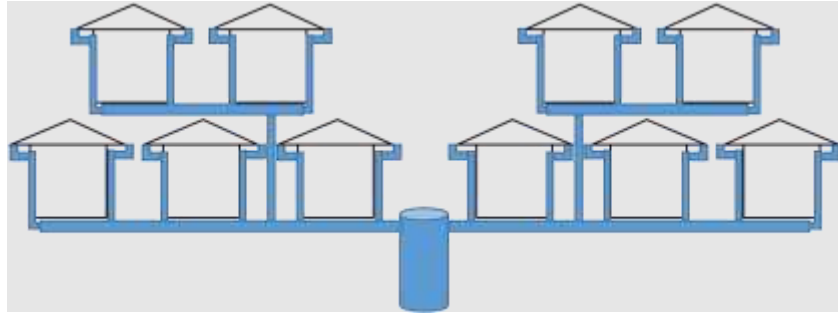


Figure 4.8. Schematic diagram of a shared communal rainwater harvesting system



Figure 4.9. Illustrative example of communal rainwater harvesting clusters along the coastline.

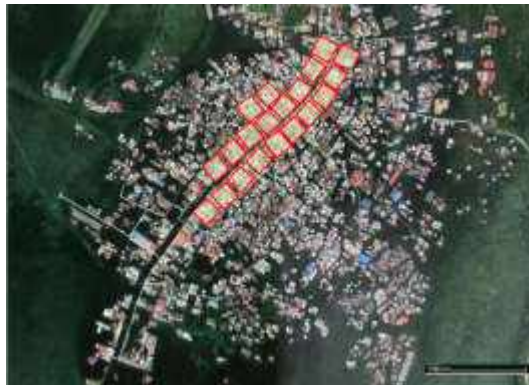


Figure 4.10. Illustrative example of communal rainwater harvesting with a cluster of households in a network of canals and bridges

#### 4.2.7 Pilot demonstration of communal sanitation and hygiene

Sanitation and hygiene practices in Sibutu and Sitangkai Islands need further improvement to maintain good health and well-being among the people. About 10 **demonstration pilots of suitable and appropriate sanitation systems** are proposed for a group of households targeting communities built on stilt housing (Figures 4.11-4.12), where shared communal toilets and septic tanks are built within a cluster of houses, supplied with improved rainwater harvesting systems or with improved water supply and distribution. Detailed design options [15] are presented for consideration, selection, and acceptance by the target beneficiaries. For example, a comb-like network along the coastlines (Figure 4.11) or a web-like network (Figure 4.12) along canals or foot bridges may be considered for a communal sanitation system serving a cluster of households, whichever is suitable and agreeable by the households.

In addition to sanitation and hygiene, **proper and efficient solid waste management (SWM)** is seriously pursued in the island to tap resources from wastes, create additional jobs, increase economic productivity in the communities, and promote circular economy. A simplistic three-phase implementation plan is drawn and recommended [15] to achieve this purpose.

**Institutional strengthening and project management** are done to ensure sustainability of the facilities and infrastructure developed and enhanced by the project. Of great importance is the capacity building activities of the project, which include the establishment of the IWRM, the formulation,



implementation, and enforcement of policies to support the operation and maintenance of the established water infrastructure, and trainings of target beneficiaries and stakeholders based on their expressed needs, to support capacity building programs. Water governance is of utmost importance to ensure the sustainable supply of clean and potable water in the island.



*Figure 4.11. Illustrative example of a comb-like network of shared communal sanitation system with a cluster of households along the coastline*



*Figure 4.12. Illustrative example of a web-like network of shared communal sanitation system with a cluster of households along canals or foot bridges.*

#### **4.2.9 Pre-construction activities**

**Pre-construction activities** include land clearing and site preparation, construction of temporary project site workstation (when needed) and access routes, construction of infrastructure, workshops, and other necessary common facilities and related facilities, prior to actual construction phase. Preparation of relocation sites of displaced households (whenever necessary, but not envisioned in the project) from the facility areas/sites.

Further, this project phase mainly involves conducting reconnaissance studies, ground truthing, collection of primary and secondary data, which are related to the project scope and sites, consultation and discussion meetings with stakeholders, procurement of relevant permits and clearances from appropriate government units, contractor pre-qualification, tendering, and awarding of construction contracts.

#### **4.2.10 Construction activities**

**Construction activities** include construction of the desalination facility, its solar PV power facility, water supply and distribution infrastructure, commercial and social facilities, workshops, warehouses, and other necessary common facilities and related facilities for project implementation. All facilities and infrastructure are powered by solar energy or have provisions for electricity connection from the existing solar-PV power plant. Demonstration pilots of rainwater harvesting systems are done as well as that of sanitation systems where toilets connected to septic tanks are installed.

During this phase, decisions and tasks related to construction timetables, major activities, indicative equipment used, sources of construction materials, support services and facility requirements are ascertained. The construction phase may take 12-18 months, considering the different locations of the project's water sources and the vast scope of the water distribution network. Major construction

activities may involve mobilization, clearing and grubbing, installation of the major facilities, solar-powered pumps and gadgets, installation of pipelines and piping systems, rehabilitation of water tank structures and well protective enclosures, installation of communal rainwater harvesting systems and sanitation facilities, construction of septic tanks, installation of water storage facilities, and other similar or related activities.

Construction materials, equipment, and machinery will be sourced locally within the island and from nearby towns or other islands, if available. Support services and facilities at the project site will include a field office, housing for workers, canteen (if not available within the workers' housing facility), warehouse, temporary sanitary facilities (when not available near or within the project sites), first-aid and emergency kits, communication network, and transport services. Power and water requirements are sourced locally.

#### 4.2.11 Post-construction activities

**Post-construction or operational activities** include the running operation and maintenance of developed desalination facility powered by solar energy, rehabilitated water supply and distribution systems, also powered with solar energy. Operation, maintenance, and facilities supervision of the demonstration pilots are also done. Impounding, filling, and maintenance of areas are also included.

After construction, the workers, equipment, and support facilities will be removed from the project sites unless these are deemed to remain in place by the ensuing water service provider (water district), which will assume the operation and management of the project facilities. During the removal process, hauling and disposal of the remaining construction materials and cleaning of the debris will be the responsibility of the project and its assigned personnel.

During operation and maintenance phase, the project may facilitate the start of the transfer of ownership of the facilities to the ensuing water service provider (water district); and after the project life span of four (4) years, the transfer agreement should already be closed and done with. This is to ensure proper and efficient turnover and transfer of facilities and the associated responsibilities regarding environmental and social compliance to the new owner, which is the water district, with the proper document revisions, updating, and arrangements with the direct stakeholders. The ESMP should still be in-place and properly implemented and monitored.

#### 4.2.12 Scheduling, staffing and support

The project will operate eight hours a day for about 300 days a year, following regular work hours and national/local holidays, during the construction phase. Since workers are sourced locally, whenever possible, local socio-cultural and religious norms and regulations are respected. The project's establishment of the water service provider would allow provisions for continued operation and maintenance of the facilities after the construction phase and after the project life span. Local staff to be hired should be in accordance with the requirements of the job, following hiring protocols, and with the proper qualifications, skills, and remunerations for the job. Needs-based training support will be planned for all staff to ensure efficient management of the facilities. The applicable ESMP in managing the facilities should be implemented and monitored regularly.

The indicative manpower requirements during construction and operation & maintenance (O&M) are shown in **Table 4.2**. Additional manpower may be hired depending on the requirements and progress of the actual construction, and O&M of the systems and facilities. Some workers are required by the water service provider, who manages the water system infrastructure in the long term.

**Table 4.2. Manpower requirements during construction and operation phases**

Position/Job	Expertise/Skills	Requirements	
		Construction	Operation
Civil engineer	Construction	1	-
Technical specialist	Electrical, solar PV installation, piping, sanitation works	1	1
Construction foreman	Construction	1	-
Plumber	Plumbing, piping, sanitation	2-3	1
Mason	Construction	2-3	1
Carpenter	Construction	2-3	-
Helpers (civil works)	Construction	3	1
Technician/Helper (electrical/solar works)	Electrical & solar PV installation	3	1
Technicians/operators	Operation and maintenance of desalination facility	2	4
Bookkeeper/Accountant/Collector/Biller	Bookkeeping/Accounting/Billing	-	2-3
Manager and Administrative Staff	Management & administrative work	-	2-3
<b>Total</b>		<b>14-20</b>	<b>13-15</b>

#### 4.2.13 Life span

The project life span is four (4) years, but the water supply and distribution infrastructure should be operated and maintained for perpetuity (as long as the local communities need them). This will be made possible thru the project's establishment of the island's water service provider (or water district), which will ensure the sustainability of the system and its infrastructure in the long term.

#### 4.2.14 Operation and maintenance activities

During this phase, the installed desalination facility powered by solar energy and the rehabilitated water supply and distribution infrastructure, are operated and maintained properly by the project and continued by the established water service provider (water district) personnel. Proper protocols for cleaning, operation, shutdown, treatment, and equipment maintenance are ensured to be in-place as part of its daily, weekly, or monthly work routine. Workers are trained and monitored regularly regarding proper operation and maintenance procedures, environmental and social mitigation protocols, emergency response policies, and grievance management mechanism.

#### 4.2.15 Facilities and services, required off-site facilities

**Power supply.** Electricity during pre-construction, construction, and post-construction phases will be provided by portable generators, solar PV power facility (available in Tongmageng), and the TAWELCO island electricity grid. During the operation and maintenance phase, electricity comes from solar power (for pumps and gadgets for water supply infrastructure), solar PV power plant (in Tongmageng supplemented by the additional capacity dedicated for the desalination facility), and the TAWELCO island electricity grid, as needed.

**Water supply.** Supply of water during the various phases of the project implementation comes from the existing water sources near or located at the project sites and may be sourced from other islands such as Sibutu.

#### 4.2.16 Solid, liquid, and gaseous discharges

The major sources of solid, liquid, and gaseous discharges expected during the different phases of project implementation are fugitive particulates and construction wastes. **Table 4.3** shows the summary of the pollution control strategies of these identified solid, liquid, and gaseous discharges during project implementation.

#### 4.2.17 Sources of nuisance (noise, odor, visual nuisance)

**Construction phase:** Most construction noise and odor originate from equipment powered by either gasoline or diesel engines, in which a large part of these noise and or odor emitted is due to the intake and exhaust portions of the engine cycle. These construction activities are carried out in Tongmageng and in other project sites where the water supply sources are located, which are relatively far (0.5 km or more) from major communities.

**Table 4.3. Pollution control strategies for the project**

Project phase	Brief description of activities	Wastes generated	Key environmental and social issues	Planned mitigation activities
Pre- and construction phase	Mobilization of construction equipment; Establishment of temporary work areas; Construction and rehabilitation of water tanks, Improving piping system, pipe laying; Testing and commissioning;	Emission of gaseous pollutants (CO, CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>2</sub> , N <sub>2</sub> O, O <sub>3</sub> ); emission of particulate matter or pollutants (PM 2.5, PM10)	Air pollution; Water pollution; Land pollution; Solid wastes generation	Dust suppression measures; Mask wearing by workers; Good housekeeping practices
	Domestic activities of workers	Generation of sewage and solid wastes	Land pollution; Water pollution; Air pollution	Provision on onsite sanitation facilities; Good housekeeping practices
Operation phase	Water supply, treatment, and distribution	Water leakages; chlorine solution spillage during water disinfection	Water pollution	Proper handling of water tanks and pipelines; proper treatment protocols; protocols in place
Abandonment phase	Dismantling of equipment, facilities, supports	Generation of solid and hazardous wastes	Land pollution, water pollution	Proper waste collection, treatment, and disposal

An important option in construction noise mitigation is controlling sound at source. Source control techniques may be approached using either muffler requirements or maintenance and operational requirements. One remedy for controlling much of the engine noise is the use of adequate muffler systems. Reductions of 10 dBA or more can be achieved with optimal muffler systems. Muffler requirements can be easily integrated in contract specifications with enforcement simply and easily done. Mufflers are effective in reducing engine-produced noise at a low cost to the user.

Poor maintenance of equipment may cause very high noise levels. Faulty or damaged mufflers, loose engine parts, rattling screws, bolts, or metal plates all contribute to increasing the noise level of a machine as well as improper handling and operation. Contract specifications can be written to require that all equipment be regularly inspected for deficiencies in the maintenance area and require the proper training of equipment users.

**Operation phase:** Pollution due to noise, odor, and visual nuisance is not expected during this phase because the water treatment and distribution from the source is powered by solar energy (from solar PV power facility) and or run by compact and modular equipment (e.g., solar-powered pumps and automated chlorinator system).

#### **4.2.18 No need for resettlement plan or development plan for vulnerable groups**

During the project implementation, there are no families, households, and communities, who are seen nor envisioned to be relocated or resettled; thus, there is no need for a resettlement plan. Most of the physical infrastructures, albeit basic and rudimentary, are already existing and where new construction sites will be identified as needed (e.g., in Tongmageng for the desalination and solar PV facilities, water distribution systems, sanitation systems, septic tanks), these are carried out in areas without existing households affected. However, in case such relocation of affected households may happen, the project's ESMP and the LGU's requirements and protocols for such cases are respected and followed.

## **5. DESCRIPTION OF THE PROJECT ENVIRONMENT AND SOCIAL CONTEXT**

### **5.1 Physical environment**

This chapter presents and evaluates the existing conditions and the baseline data of the relevant environmental characteristics of the study area. It includes information on any changes anticipated before the project commences and assesses the key environmental and social impacts, wherever necessary. Assessment was done using the available maps and qualitative analysis, supported by secondary data on previous reports and documents. The detailed discussions are shown in **Annexes C and D**.

#### **5.1.1 Climate and meteorology**

The area of Sibutu and Sitangkai group of islands falls within the region of Climate Type II of the Modified Coronas Climate Classification System (MCC), see Annex C.1.2 for details. Type II climates have wet seasons but no dry seasons; it is defined as having "No dry season with a very pronounced maximum rain period from December to February." Thus, rainwater harvesting makes sense in these islands. There is not a single dry month. Minimum monthly rainfall occurs during the period from March to May. The average maximum daily temperature in Sibutu is between 29-30°C while the minimum can reach an average of 24-25°C while in Sitangkai is between 27-28°C and 25-26°C. Annual precipitation is generally less than 2,000 mm. Rainwater is a reliable source of fresh water supply in these islands; but during the peak season of the summer months, there can be long days with no rain at all, causing distress to the local folks as rainwater tanks ran out to dry. Typhoon risks are very low in the region where Sibutu and Sitangkai are located. This is corroborated by the local island folks as typhoons are not experienced in the area. This is a major contributing factor to the conducive climate for seaweed farming when the sea is not drastically disturbed by strong winds and typhoons.

#### **5.1.2 Topography, geology, and soils**

Sibutu Island, together with Sitangkai Island, are two of Tawi-Tawi's group of islands located at the southwestern tip of the Philippine archipelago across the water of the state of Saba in East Malaysia. The islands have a mixture of sloping and plain areas. The topography varies from 42% plain (nearly level and undulating to rolling) to 58% rolling. These islands are coral formation with low, swampy, flat, and forested areas [17]. The Sibutu and Sitangkai Islands are basically made up of limestone. Further descriptions of the land cover of both islands are presented in Annex C.1.3.

### 5.1.3 Inducement of natural hazards

The description of natural hazards which serves as the guidelines in assessing the project site in Sibutu Island along with the relevant findings of the initial hazard assessment is shown in **Table 5.1**<sup>6</sup> (see Annex C.1.4 for details). The susceptibility of the project sites to hydrometeorological hazards was evaluated using the hazard assessment tool of GeoRisk Philippines, a multi-agency initiative lead by the Philippine Institute of Volcanology and Seismology (PHIVOLCS) funded by the Department of Science and Technology (DOST) and monitored by the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD).

---

<sup>6</sup> [www.georisk.gov.ph](http://www.georisk.gov.ph)



**Table 5.1. Description of natural hazards in assessing the project sites**

Natural hazard	Description	Initial assessment of hazard
Ground rupture (Seismic hazard)	Ground rupture occurs when the earthquake movement along a fault breaks the earth's surface. Surface or ground rupture shows a visible offset of the ground surface and poses a major risk to any structure built across an active fault zone.	For both islands (Sibutu and Sitangkai), generally susceptible.
Liquefaction (seismic hazard)	Liquefaction occurs when a saturated or partially saturated soil substantially loses strength and stiffness due to an applied stress such as ground shaking during an earthquake. It can also result from the sudden change in stress condition in which a material that is ordinarily solid behaves like a liquid.	For both islands (Sibutu and Sitangkai), generally susceptible
Tsunami (seismic hazard)	Tsunami is a series of sea waves commonly generated by under-the-sea earthquakes and whose heights could be greater than 5 meters. It is erroneously called tidal waves and sometimes mistakenly associated with storm surges. Tsunamis can occur when the earthquake is shallow-seated and strong enough to displace parts of the seabed and disturb the mass of water over it.	For both islands (Sibutu and Sitangkai), generally safe; General inundation, inundated.
Earthquake-induced landslides (seismic hazard)	A landslide is the mass movement of rock, soil, and debris natural process occurring in steep slopes due to gravity. It occurs when the driving force is greater than the resisting force. The movement may range from very slow to rapid. Ground vibration created during earthquakes is the driving force for earthquake-induced landslides.	For both islands (Sibutu and Sitangkai),, 100% Safe
Rain-induced landslides (hydrometeorological hazard)	A landslide is the mass movement of rock, soil, and debris natural process occurring in steep slopes due to gravity. It occurs when the driving force is greater than the resisting force. The movement may range from very slow to rapid. Intense rainfall is the driving force for rain-induced landslides.	<p><b>For Sibutu:</b>                      Low susceptibility – 79.1%                      Not prone – 20.3%                      Moderate Susceptibility – 0.2% near the coastal areas                      High Susceptibility – 0.4%</p> <p><b>For Sitangkai:</b>                      Low susceptibility – 27.3%                      Not prone – 72.7%</p>
Storm-surge (hydrometeorological hazard)	A storm surge is the abnormal rise in sea level that occurs during tropical cyclones or “bagyo”. It is caused by strong winds and low atmospheric pressures produced by tropical cyclones. As the tropical cyclone approaches the coast, strong winds push the ocean water over the low-lying coastal areas, which can lead to flooding.	For both islands (Sibutu and Sitangkai),, generally safe; generally inundated
Flooding (hydrometeorological hazard)	Flood hazard means a potential danger to life, property, or natural resources due to storm water runoff or inundation, including deposition of slit and debris, erosion, or the presence of standing water.	<p><b>For Sibutu,</b> moderate to high susceptibility especially along the coastal areas surrounding the island.</p> <p><b>For Sitangkai,</b> high susceptibility especially along the coastal areas surrounding the island</p>

The project implementation is not seen to induce subsidence, liquefaction, landslides, or mud/debris flow, storm surges, and other natural hazards. The project components require small areas located in various sites of the island and require small footprints. In addition, the project sites are also generally safe from major seismic, volcanic, and hydrometeorological hazards except during very heavy rainfall, which can induce landslides and flooding.

#### 5.1.4 Terrestrial Flora and Fauna

**Site survey and limitations.** Terrestrial flora and fauna assessment was conducted onsite during the scoping visit last December 5-16, 2022 (see Annex C.1.5 for details). This study was conducted as a one-time survey and thus the lack of seasonal sampling can lead to either low or non-detection rates. This is especially for seasonal plants and highly mobile species that can use different habitats across their range at any given time. To compensate for this limitation, secondary data were used (see Annex C.1.5 for details). As part of the mitigation monitoring activities, occasional sampling can be done to address this limitation.

**Flora and vegetation communities: Species richness.** The proposed project does not fall within critical ecosystems such as forests and wetland ecosystems. In fact, the area of study is either grassland, cropland, or scrubland. This is based on the general observation of the site and corroborated by the floral survey. Of the 26 floral species observed, the habits are trees (37%), grass (15%), shrubs (19%), herbs (11%), ferns (7%) and vines (7%), see further details in **Annex D**.

**Threatened flora and conservation significance.** A huge majority of the flora is native, yet exotics were also detected in the site. No threatened flora or endangered populations were recorded during the site analysis. However, the observation of the *Atalantia retusa* in Brgy Ligayan should be noted. This plant is endemic to the Philippines and currently has not been assessed in terms of conservation status.

**Fauna and their habitats: Species richness.** Few faunal species were observed in the short term, small range site assessment. There were sightings of both wildlife and domesticated animals suggesting that there is still an integrated and balanced faunal diversity in these locations. Specifically, there were sightings of the following: Little Egret (*Egretta garzetta*), Intermediate Egret (*Ardea intermedia*), Night-heron, domesticated duck (*Anas* sp.) and Long-tailed Macaque (*Macaca fascicularis*). Locals also mentioned sightings of the wild boar, peacock (dandadunay) and wild roosters (labuyo). This sparse observation does not discount the faunal richness and diversity of both Sibutu and Sitangkai Islands. Sibutu has a rich avifaunal diversity with a documented 39 avifauna species, of which only one is introduced [21].

**Threatened fauna and conservation significance.** Sibutu is particularly home to critically endangered birds, vulnerable birds, and a threatened reptile. These are the *Otus mantananensis* (Mantanani Scops Owl), *Ninox reyi* (Sulu Hawk-Owl), *Prioniturus verticalis* (Blue-winged Racket-tail), *Tanygnathus sumatranus* (Blue-backed Parrot) and *Boiga cynodon* (Philippine dog-toothed cat snake) [22]. Although, all these endemic bird species are forest dependent [23]. On the other hand, Sitangkai Island is a priority wetland area [21]. This status is an implication of the rich biodiversity of the island. However, the sampled sites which are the sites to be potentially affected by this proposed project on the desalination facility were seagrass ecosystems (see **Section 5.2** on Biological Environment, subsection on coastal and marine flora and fauna).

**Ecological disturbance.** Climate change is indeed a major threat to global biodiversity and its effects already started to manifest in both Sibutu and Sitangkai Islands [24, 25]. This report, however, emphasizes more potential threats as confirmed and documented as well during the site assessment. Slash and burn (kaingin) are practiced in the area for land preparation in farming [24]. In addition, traces of debris left from open burning of solid wastes in shallow pits are also observed. This form of agricultural practice can cause severe erosion, loss of soil nutrients, damage to watersheds, loss of floral and faunal biodiversity [26]. Invasive species were observed during the survey. These are considered threats since they usually outcompete native species in terms of resources (e.g., space, nutrients) leading to biodiversity shift and eventual decline of the native population. If left unchecked, eventual loss of such affected native species may happen. Mismanaged waste was also observed on the island, as revealed by slots of spaces (shallow pits) filled with garbage. The most common threat posed by these mismanaged wastes, especially the non-biodegradable ones such as plastics, cans, and broken glass, are entanglements and ingestions causing injury and death to animals.

#### 5.1.5 Surface Water and Groundwater Hydrology

A Groundwater Availability Map (also referred to as Hydrogeologic Map) for the province of Tawi-Tawi was reported in the study on the "Comprehensive Basic Survey of the Autonomous Region in Muslim Mindanao, Water Supply and Sanitation Sector Province of Tawi-Tawi" [27], to identify areas or geologic formations with available groundwater. The study categorized groundwater availability in terms of the potential and hydrogeologic properties of geologic units underlying the province. This study categorized the **Islands of Sibutu and Sitangkai as Recent Alluvium/Corals**. Well depth not to exceed 6 meters can be found in most localities. Near the coast, the well, mostly dug wells are only a few meters deep. In such cases, only shallow hand-pumped wells and/or dug wells are recommended. Saltwater intrusion is common in most of the wells near the coast.

In the most recent survey-visit, there are at least five (5) reported historical instances in Sibutu when identified shallow wells were abandoned as water supply became brackish; this prompted the local folks to find other wells with fresh water supply farther from the coastline.<sup>7</sup> In Sitangkai Island, the situation is worst as all dug wells have brackish water. Water quality in most shallow wells near the coastline is brackish, indicating saltwater intrusion and therefore not potable. **Tables C.4-C.5** in Annex C.1.6 shows the list of identified water resources in Sibutu and Sitangkai Islands with its GPS coordinates. The water distribution network (Level II and in a few instances at Level III) from the water sources is already established, albeit some are rudimentary, temporary, which currently supply water to households and communities. The non-operational water sources need rehabilitation of the wells and their corresponding distribution network.

### 5.1.6 Ambient Air Quality

The ambient air quality profiles of Sibutu and Sitangkai Islands are forecasted daily. Occasionally, the AQI borders on Fair (AQI = 20-21) considering the four (4) important air quality pollutants, namely: Ozone (O<sub>3</sub>), Particulate Matter 2.5 & 10 (PM 2.5, PM 10), and Carbon Monoxide (CO), see Annex C.1.7 for details. These data are consistent all throughout the year, mainly due to its location, which is very far from common sources of these air pollutants (e.g., heavy industries, large-scale and long-term construction activities, and heavy transportation and traffic conditions).

### 5.1.7 Existing Sources of Air Emissions

Airborne pollutants or air emissions in Sibutu and Sitangkai Islands are mostly coming from boats and ships roaming around or passing by its vicinities. Occasional large ships powered by diesel or bunker fuel would bring massive air emissions but could quickly dissipate. It is noted that there are traces of “open burning” of solid wastes on the islands as well, which can be a cause or source of occasional air emissions. These cases may have contributed to the occasional slight increase in the island’s AQI and hit the lower border of Fair ratings (AQI of 20-21).<sup>8</sup>

## 5.2 Biological Environment

### 5.2.1 Marine and oceanographic characteristics

Sibutu and Sitangkai Islands in Tawi-Tawi are situated between two biogeographic regions of the Philippines: the Sulu Sea to the northwest and the Celebes Sea to the southeast. The Sibutu passage, which is an international sea-lane that separates the Sibutu and Sitangkai municipalities from the rest of Tawi-Tawi, serves as the main connection between the two seas. Coastal resources in Sibutu and Sitangkai Islands are mainly characterized by corrals and seagrass/seaweeds.

### 5.2.2 Coastal and marine flora and fauna

**Site Survey and limitations.** Marine assessment was conducted on the sampled areas of the island last January 11-14, 2023 (see Annex C.2. for details). This study was conducted as a one-time survey and thus the lack of seasonal sampling can lead to either low or non-detection rates. This is especially for seasonal plants and highly mobile species that can use different habitats across their range at any given time. To compensate for this limitation, hence the use of secondary data.

**Marine biological resources.** Sibutu, just like Sitangkai Island, is a priority wetland area [28]. This status is an implication of the rich biodiversity of the island for both terrestrial and marine ecosystems. However, the sampled sites are the envisaged sites that can potentially be impacted by the improved sanitation facilities near the coastal communities (of Barangays Ligayan (Tandu Owak), Taungoh, and Imam hadji Mohammed). Sitangkai Island is a priority wetland area [21]. This status is an implication of the rich biodiversity of the island for both terrestrial and marine ecosystems. However, the sampled sites which are the envisaged project sites for the desalination facility (Tongmageng) and for improved sanitation facilities near coastal communities (Tongmageng, Datu Baguindah Putih, and Panglima Alari), that can be potentially affected by this proposed project, were seagrass ecosystems.

**Marine flora: Species richness.** The sampled site is a seagrass ecosystem but few reef species were also obtained towards the end of the transect laid out at Barangay Imam Hadji Mohammed. A total of 12 species of seaweed and three species of seagrass were observed in the sample sites of Sibutu Island (**Annex D**). Despite observing a few species and a dense floral cover as indicated in the number of individuals in Barangay Ligayan (Tandu Owak), the computed indices still indicated a degraded ecosystem. Diversity is bad, it is unbalanced and disturbed [29] and the situation

---

<sup>7</sup> Key informant interviews (KIIs), Sibutu Island, Dec 2022.

<sup>8</sup> <https://www.accuweather.com/en/ph/sibutu/760535/air-quality-index/760535>

is worse for Barangays Taungoh and Imam Hadji Mohammed. Among the reasons for this is that nearshore quadrats had turbid waters, and devoid of flora, which is caused by pollutants and contaminants mostly derived from anthropogenic activities.

Observed in the sampled sites in Sitangkai were 3 species of seagrass and 11 species of seaweed (**Annex D** for more details). The first 30 meters from the shore for the transects established at Barangays Datu Baguindah Putih and Tongmageng were turbid and had no vegetation. Essentially, if the water is so turbid it inhibits light from penetrating, which can be limiting for photosynthetic organisms, hence the absence of flora in these sites. Data shows that Datu Baguindah Putih has the least number of species, but are evenly distributed, thus, the diversity index is highest among the sites, but the diversity index is still classified as poor, while that in Panglima Alari and Tongmageng are really in a bad status [26]. Cover may be higher for Panglima Alari with the highest number of individuals, but this is primarily due to the dominance of a single species, *Enhalus acoroides*. The Margalef Richness Index for all sites (**Tables 5.3 and 5.4**) is less than 2.05 which means that all sites are disturbed [26]. This should be noted as well that there was no distinction in the diversity of the transects laid out in Barangay Tongmageng, which is where the desalination facility will be established (**Annex D**).

**Table 5.2. Diversity Indices of the sampled sites in Sibutu Island**

Parameters on Sampled Sites	Ligayan (Tandu Owak)	Taungoh	Imam Hadji Mohammed
Number of Species	12	3	7
Number of Individuals	2,466	54	427
Shannon Weiner Index of Diversity	0.22	0.84	0.78
Evenness Index	0.10	0.77	0.31
Margalef Index	1.41	0.51	0.99

**Table 5.3. Summary of the diversity indices of the sampled sites in Sitangkai Island**

Parameters on Project Sites	Datu Baguindah Putih	Panglima Alari	Tongmageng
Number of species	5	9	6
Number of individuals	440	2,982	720
Shannon Weiner Index of Diversity	1.48	0.45	0.54
Evenness Pielou Index	0.88	0.17	0.29
Margalef Richness Index	0.66	1.0	0.76

**Threatened flora and conservation significance.** No threatened flora upon observation at the sample sites. As validated using the SeaLifeBase website<sup>9</sup>, all the observed seagrass and seaweed species are either not assessed or of least concern. It should be noted however that in Barangays Datu Baguindah Putih and Panglima Alari of Sitangkai, the presence of *Halophilla ovalis*, is reported, which is a preferred forage of dugongs (marine mammals) [27].

**Marine fauna and their habitats: Species richness.** There were quite a few species observed in the sampling sites. Common species observed in a seagrass ecosystem such crabs, brittle stars and urchins were observed (**Annex D** shows a complete list of species observed). It should be noted that the established transect during sampling was able to document reef species such as corals, suggesting that this ecosystem is near the island. In fact, Sibutu marine ecosystems is reported to have rich resources [28]. Further, it was observed that the hard coral cover in this island is in excellent condition in the north while it is in poor condition in the south [30]. The coral reefs of Dungun Dungun in Sibutu are also referred to as spawning aggregated sites of the humphead Napoleon wrasse (*Cheilinus undulatus*).<sup>10</sup>

In Sitangkai, macroinvertebrates were the most common species observed in the sampled sites. Among them were 3 species of crab, 1 cowrie, 3 species of urchin, 1 species of brittle star and seahare (**Annex D**). These were particularly abundant in transects with the highest floral cover, which

<sup>9</sup> SeaLifeBase Website. Available at <https://www.sealifebase.ca/>. Accessed in January 2023.

<sup>10</sup> Romero FG and Injani AS, 2015. Assessment of humphead wrasse (*Cheilinus undulatus*), spawning aggregations and declaration of marine protected area as strategy for enhancement of wild stocks. In MRR Romana-Eguia, FD Parado-Esteva, ND Salayo, and MJH Leбата-Ramos (Eds.), Resource Enhancement and Sustainable Aquaculture Practices in Southeast Asia: Challenges in Responsible Production of Aquatic Species: Proceedings of the International Workshop on Resource Enhancement and Sustainable Aquaculture Practices in Southeast Asia 2014 (RESA), pp. 103-120. Tigbauan, Iloilo, Philippines: Aquaculture Dept., Southeast Asian Fisheries Development Center.

is Barangay Panglima Alari. A detailed representation of where these were observed is presented in **Annex D**. Meanwhile, in terms of offshore reefs, Sitangkai, Sibutu and all Tawi-tawi marine ecosystems have rich resources [21]. Meanwhile, in a fish assessment conducted in Sitangkai waters, of the 135 occurrences, most of the fishes belong to the family Pomacentridae (28%), Labridae (13%), Apogonidae (10%), Nemipteridae (6%), Scaridae (6%) and Chaetodontidae (6%) [28].

**Threatened fauna and conservation significance.** *Tridacna maxima* was observed in Barangay Imam Hadji Mohammed in Sibutu along with some coral species. *T. maxima* is currently classified as low risk, but the conservation is closely monitored. A similar case for the coral species (*Acropora* sp. and *Pocillopora* sp.) was also observed, which should be protected. Furthermore, Sitangkai, Sibutu and the rest of Tawi-tawi are a nesting area for the Green Sea Turtle (*Chelonia mydas*), Hawkesbill Turtle (*Eretmochelys imbricata*), and Leatherback Turtle (*Dermochelys coriacea*); in these areas, Dugongs (*Dugong dugon*), which are marine mammals, are occasionally sighted as well [28].

**Disturbance to biological resources.** Climate change is indeed a major threat to global biodiversity and its effects are observed and experienced in Sibutu and Sitangkai [24]. However, it is emphasized that anthropogenic activities pose more potential threats as documented during the site assessment. Slash and burn (kaingin) are practiced in the area. This form of agricultural practice can cause severe erosion, loss of soil nutrients, damage to watersheds, loss of floral and faunal biodiversity [26]. Invasive species were also observed during the survey sites. These are considered threats since invasive species usually outcompete native species in terms of resources (e.g., space, nutrients) leading to biodiversity shift and eventually the decline of the native population. If left unchecked, this leads to eventual loss. Mismanaged waste was also observed on the island. The most common threat posed by mismanaged waste, especially plastics, cans, and broken glass, to both land-based and aquatic animals are entanglements and ingestions.

Particularly observed near shore is the turbidity of the sea water, which is indicative of the presence of suspended or dissolved solids in water. This further suggests that the water has either clay and silt, fine organic and inorganic matter, soluble colored organic compounds, algae, and other microscopic organisms. Based on the local practice of direct waste disposal to the sea, especially fecal waste, and the lack of sewerage systems, it is inevitable that such waste culminates nearshore, causing water turbidity. Turbidity, which was observed near the shores, especially where communities built their stilt houses, is a major threat to marine organisms. In fact, it is obvious to be the primary reason that the first 30 m of the transect during sampling were devoid or with limited biota, since this can prevent light to penetrate the seawater, thus, limiting photosynthetic organisms to grow, subsequently, resulting in less fauna and forages for other species as well. If not mitigated, this may lead to further deterioration of the marine resources especially the nearby reef ecosystems, which are more sensitive to sedimentation.

### 5.2.3 Existing marine water pollution discharges

Most households in Sibutu and Sitangkai Islands live along coastal areas and many are with houses built on stilts. There are no water treatment facilities on the island and communities along the coast commonly practice open defecation in hanging latrines, where waste is directly discharged to the sea. Wastewater from domestic activities (e.g., cleaning, washing, laundry, others) is also directly discharged to the sea without prior treatment.

In addition, there is no proper municipal solid waste management system on the island. A large percentage of the solid wastes are directly thrown into the sea, while some are occasionally buried in shallow pits, which are found in nearby farms, forests, and grasslands. Other waste ends up burnt in open fires, a common practice among residents, which is technically a violation of the national law (RA 9003), covering ecological solid waste management.

All these wastewater and solid waste discharges caused substantial marine water pollution which greatly affected the seaweed farming and fishing productivity, which are major sources of income for the locals. This situation further exacerbates the austere and dire socio-economic conditions of the local communities.

## 6. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROPOSED PROJECT

This chapter presents the general environmental and social impacts which may result from the proposed project. The emphasis is initially on the specific impacts that are likely to result from the nature of the works to be done, which may include excavation, laying of pipelines and fittings, and concrete works for the tanks, supports, valves and chambers. Further, this section distinguishes between



significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts during the construction and operation phases indicating their importance level and their probability of occurrence. It also identifies impacts that are unavoidable or irreversible. Wherever possible, it describes impacts quantitatively. Cumulative effects are also addressed considering other projects or actions planned in the study area.

To note, the project sites do not involve and affect territories inhabited by indigenous peoples, which can lead to involuntary resettlement; thus, the environmental and social issues that may arise from this concern is not addressed in detail.

In general, the successful implementation of the project will have high environmental and socio-economic benefits to the people and will contribute to the improvement of the water supply and sanitation infrastructure in the area. Overall, the expected negative impacts are related to the earthworks and laying of the pipelines as well as the effluent management of the desalination facility. These impacts are localized and not considered significant and long-lasting and can be abated through appropriate mitigation measures. The severity and duration of these impacts can be minimized by ensuring that the excavation and construction works are limited to short working sections and that works are carried out rapidly and efficiently.

The ESIA study, based on the screening of the environment and socio-economic baselines in combination with a review of proposed civil works, has identified potentially significant environmental and social impacts, but the mitigation measures incorporated into the project design and the Environmental and Social Management Plan (ESMP) will either prevent impacts occurring, or reduced or compensate these impacts such that they are no longer significant. Furthermore, the project design will ensure that the positive impacts will greatly outweigh the negative ones (if there are any significant ones) in the process and at the end of the day.

There will only be localized short-term impacts during construction due to the implementation of the civil works. Impacts have been addressed at the design stage by choosing engineering solutions that, as far as possible, minimize these impacts during construction. During the operational phase, the project will deliver the intended benefits while the water pipeline infrastructure will be hidden from view below the ground or under foot/transport bridges. The impacts which could not be eliminated by the design, are mostly impacts during construction, which will be reduced or eliminated by mitigation and monitoring measures specified in the ESMP.

## 6.1 Environmental impacts

### 6.1.1 Possible environmental impacts during pre-construction and design phase

**Climate change vulnerability.** Planning for the potential impacts of climate variability, and natural hazards, will help to mitigate against potential impacts which may include sea water inundation resulting in failure of water and electrical systems infrastructure, and subsequent loss of public water supply.

The risks that are associated with climate change and variability are related to sea level rise, sea surge risks, temperature rise, decreases in rainfall (whether long term or in terms of extreme dry years or season) and storm severity. Although the islands of Sitangkai generally have low vulnerabilities to typhoons and other natural disasters, the following impacts of climate change are still considered and summarized to wit:

- a) Sea-level rise which exacerbates the severity of sea surges, increased rates of coastal erosion and heightened risks to public and private infrastructure;
- b) More intense and more frequent storms which increase risks of damage from sea surges, high winds, and strong inundation on public and private infrastructure; and
- c) More frequent and longer periods of drought: which cause both intense short-term difficulty and, of greater concern, long term damage to the freshwater lenses that exist beneath the islets.

Therefore, for an estimated project area of 0.8-1.2 ha of which roughly 80% is dedicated for the desalination facility and its 1MWp solar PV power plant, it is highly recommended to ensure that the new infrastructure is designed to withstand extreme weather events, such as sea water inundation. As the size of the solar PV farm is sufficiently large, any form of inundation, be it from the rising tides, sea surges, or monsoon rains, could potentially lead to unintended soil erosion and thereby weakening the structural supports of the solar modules or panels. Thus, to mitigate this problem, it should be designed to avoid land contouring. Nevertheless, initial site inspection suggests that the land in the intended site location in Tongmageng is basically coral and limestone. As such, the potential for erosion is generally low. It is also best to incorporate the use of vegetation, preferably native grasses, and ground cover in storm water design.

**Site selection for SWRO Desalination Facility.** When selecting a site for a desalination project, a large number of site-specific features must typically be considered depending on the specific operational aspects of the plant in question. To minimize the impacts of the project on the environment, it is generally recommendable to take at least the biological and oceanographic site features into account. Ecosystems or habitats should be avoided, if they are unique within a region or worth protecting on a global scale, inhabited by protected, endangered or rare species, important in terms of their productivity or biodiversity, or if they play an important role as feeding or reproductive areas in the region.

The site should furthermore provide sufficient capacity to dilute and disperse the salt concentrate and to dilute, disperse and degrade any residual chemicals. The load and transport capacity of a site will primarily depend on water circulation and exchange rate as a function of currents, tides, surf, water depth and shoreline morphology.

In general, exposed rocky or sandy shorelines with strong currents and surf may be preferred over shallow, sheltered sites with little water exchange. The oceanographic conditions will determine the residence time of residual pollutants and the time of exposure of marine life to these pollutants. Moreover, the site should be close to the sea, to water distribution networks and to consumers to avoid construction and land-use of pipelines and pumping efforts for water distribution. It should allow easy connection with other infrastructure, such as power grid, road, and communication network, or may even allow the co-use of existing infrastructure, such as seawater intakes or outfalls, while conflicts with other uses and activities, especially recreational and commercial uses, shipping, or nature conservation, should be avoided.

**Impacts of energy requirements for SWRO Desalination Facility.** The energy consumption from the desalination facility presents a risk to enhancing climate change through increased energy consumption and resulting increased greenhouse gas emissions. Thus, the use of a solar PV array to provide the energy source for the desalination plant is desirable. It is also important for site selection that a nearby backup generation facility is accessible to allow uninterrupted operations and supply of desalinated water to the intended communities.

**Environmentally responsible procurement.** Environmentally responsible procurement shall be guaranteed through proper planning of activities during pre-construction and design phase, ensuring environmental management plans and necessary environmental personnel are included in the design and bidding phase documents, as well as contractors' documents. Available space and laydown sites to store containerized building materials are required at the project site in Tongmageng. It should be noted that the recommended site for the desalination plant and the 1 MWp Solar PV power plant have been confirmed to be a private land and the size of the land is sufficient for construction activities.

**"Water Rights" and Rehabilitating water storage tanks.** Prior to rehabilitating the water storage tanks in Sibutu and Sitangkai and its subsequent water distribution system, the right to use the water resource from shallow/deep wells in the locality, called "Water Rights", should first be granted by the National Water Resource Board (NWRB) through concession. Under Presidential Decree No. 1067 of 1976 which instituted the Water Code of the Philippines, the provision for the utilization, exploitation, development, conservation, and protection of water resources is to be subject to the control and regulation of the government through the NWRB. The notion that the Philippine national government has sole ownership and control over the country's water resources, as provided by the 1987 Constitution (Section 2, Article XII), requires that water rights must be established through concession by the government, notwithstanding whoever owns the land where the water sources (wells) are located.

**Over-extraction of water at source.** To avoid over-extraction, which can be followed by an unfortunate irreversible saltwater intrusion, the ground water capacity, or well capacity, must be determined by pumping test. As soon as the well capacity is established, extraction of water cannot go beyond the limit of the ground water capacity. This is needed when applying for the water rights. The project needs to ensure that this is done for all existing water resources in Sibutu and Sitangkai, as applicable, in which all water rights will be assigned to the municipalities and transferred to the subsequent water service provider (water district).

**Fuel leakages on the ground.** It should be noted that all shallow wells in Sibutu and Sitangkai, equipped with diesel- or gasoline-fueled generators, are about half-a-kilometer away from the nearest coast. Thus, the electrical transmission lines that runs along the coastline cannot reach the shallow wells and power the pumps. Thus, pumping of water is carried out using diesel- or gasoline-powered motor pumps which are prone to oil and fuel leakage which can easily enter the ground water resource, as a case example in Tongmageng. Replacement of current motor pumps to solar-powered pumps can eliminate the environmental impacts due to the use of fossil-derived fuels.

**Use of solar-powered water pumps.** In designing the water supply and distribution system, it is recommended to replace all the diesel- and gasoline-fueled motor pumps with pumps powered by

clean and renewable energy source (e.g., solar PV). To note, the pumps are used to supply water to the storage tanks and to serve as booster to augment the water pressure in the pipelines to the distribution sites in the local communities.

**Communal Rainwater Catchment Systems.** A communal rainwater catchment system is ideal to augment the water supply of the community and to prevent overextraction of ground water resource when the demand for water increases. This can be carried out per cluster of 8-10 houses in a community. It can also be equipped with a pump to render the system with Level II water supply facility. To mitigate the air pollution brought about by motor-fueled pumps and to lower the carbon footprint, it is recommended to use solar-powered pumps instead of the conventional ones.

**Communal Sanitation Systems.** Most of the communities living along the coastline in Sibutu and Sitangkai have stilt houses with hanging latrines. This method of disposing human excrement is highly unhygienic and leads to sea/ocean contamination and pollution. This could potentially affect the community's health (in the form of water-borne diseases) and negatively impact the ecological balance of the marine ecosystem, which is their source of livelihood (thru seaweed farming and fishing).

By designing improved sanitation systems, it could improve the health and socioeconomics of the communities and mitigate marine pollution. The design is for a cluster of 8-10 households living within 20-30 meters to share a common treatment facility in the form of septic tanks. The effluent of which will be pumped to a designed drain field and not discharged to the sea. To mitigate the air pollution brought about by motor-fueled pumps and to lower the carbon footprint, it is recommended to instead replace conventional pumps in the design with solar-powered pumps.

**Land Preparation.** This could impact the terrestrial flora and fauna. Disturbances of the natural habitat of local wildlife could affect the ecosystem (including the migratory birds, which have been spotted during the site visits). Moreover, indiscrete removal of vegetation can lead to decaying matter and a fire hazard and the subsequent GHG emissions. Thus, cutting of flora is discretely exercised and only those in direct obstacle to the project infrastructure works are removed. Workers are prohibited to disturb terrestrial fauna around project site locations. The effects of land preparation activities could be mitigated, as included in the ESMP, the re-planting and re-growth of existing vegetation in the area and monitoring the wildlife and terrestrial ecosystem thereafter.

#### 6.1.2 Possible environmental impacts during construction phase

**Construction phase of 1,000 CMD SWRO Desalination Facility and its 1MWp Solar PV power plant in Sitangkai.** Considering that the land areas covered by the proposed project is about 0.8-1 ha, direct environmental impacts can be substantial. This will involve the removal of vegetation during construction. Further, since there are many sightings of wildlife in the area, these animals could become trapped in open excavations and installations associated with the construction if they were to enter the site. Temporary impacts could occur because of the construction activities. These could include, but may not be limited to material storage, construction equipment and vehicle parking.

**Source water intake from beach wells.** To mitigate the impacts of open intakes, a combination of differently meshed screens and a low intake velocity should be considered. This can minimize the impingement and entrainment of larger organisms, such as fish or turtles, while the entrainment of smaller plankton organisms, eggs and larvae can be minimized by locating intakes away from productive areas, e.g., into deeper waters, offshore, or underground (e.g., by using beach wells). As the intake water quality is often better in these locations than in near shore and surface waters, only minimal or no chemical pretreatment may be required. However, the initial soil disturbance during construction of below ground intakes or long pipelines may be higher, especially when this involves drilling or excavation activities. Beach well intakes are adaptable to small or medium-sized plants only.

A geotechnical and hydrogeological survey is needed prior to the drilling of the beach well for Sea Water Reverse Osmosis desalination plant in the site. A naturally poor water quality should equally be avoided, especially locations with high concentrations of particulate and dissolved organic matter, a high biological activity and thus fouling potential, or the potential for contamination of the intake water quality due to periodically recurring toxic algal blooms. Intakes that are located further offshore and in deep water layers and thus away from land-based sources of pollution and areas of high biological productivity often provide a more stable and reliable water quality than near shore surface waters. This is also true for below ground intakes, such as beach wells, where the surrounding sediment layers naturally pre-filtrate the incoming seawater.

##### **Physical and biological impacts of construction:**

**a) Heavy equipment and material mobilization.** During construction phase, the mobilization of heavy equipment and materials basically entails the deployment of prime movers and vehicles. These generally generate dusts and particulates that are suspended over the project site location. Thereby decreasing visibility and the air quality, leading to health issues such as, but not limited to, difficulty in

breathing and eye irritation. Moreover, these movers have engines that burn fossil fuels which emits greenhouse gases and substances that cause air pollution.

To minimize the impacts of heavy equipment and material mobilization, it is important that access roads to construction/project site should be relatively quiet and away from human settlements. Other mitigating activities should include the covering the tanks of transporting material vehicle with tarpaulin or anything of the like when traversing from the shipping area to the project site. It is highly recommended that vehicles used should have passed the Motor Vehicle Inspection System to be deemed worthy to transport. To avoid unnecessary dust and particulate matter emission during transport, vehicles should regularly be cleaned. Thus, developing a washhouse for vehicles is needed.

If there are materials spills on the passing road from construction materials mobilization, it should be cleaned as soon as possible. Periodic flushing of the road to avoid the suspension of dust and particulate matter should also be incorporated in the contractor's environmental management plan (CEMP).

**b) Basecamp operations.** Construction and related human activities of workers within the project site employ a substantial amount of water and therefore generate a substantial amount of wastewater. If neglected, this could lead to serious health hazards, e.g., water-borne diseases, and could potentially infiltrate the ground water resource thereby contaminating both ground water and surface water resources. This can be mitigated by providing portable toilets and construction of wastewater treatment facility such as septic tank or digester equipped with drain field.

It is also expected that the demand of water for any activity would significantly increase during the construction phase. Therefore, it is recommended to provide the project site with rainwater catchment system to harness rainwater and augment the supply of water for construction and human activities. Corollary to this, it is important to recycle wastewater like using the relatively clean wash water (e.g., the rinse water and waste water from bathing and washing of clothes) for flushing and cleaning purposes.

CEMP also includes proper implementation of segregation at source and recycling (RA 9003, or the Ecological Solid Waste Management Act) to address the solid waste generated during the construction phase. If left unabated, solid waste can end up polluting the land, and polluting the sea/ocean harming terrestrial and marine flora and fauna. It is also prohibited to burn solid waste under RA 9003 and RA 8749, otherwise known as the Philippine Clean Air Act, since burning of vegetation can lead to the emission of greenhouse gases (GHG). Recycling of materials, such as wood, metal, and concrete is advised. While biodegradable solid waste can be collected and composted to produce soil conditioners and/or enhancers.

**c) Land preparation.** Preparation of land for the project could impact the terrestrial flora and fauna. Removal of natural habitat for local wildlife could affect the ecosystem and the migratory birds (which have been spotted during the site visit). Moreover, indiscrete removal of vegetation can lead to decaying matter and a fire hazard and the subsequent emission of GHG. Thus, cutting of flora is exercised only for those who are in direct obstacle to the project infrastructure works and workers are prohibited to disturb terrestrial fauna around project site location. The effects to the disturbed terrestrial flora and fauna could be mitigated, as included in the ESMP, the planting of new habitat such as mangrove forests and monitoring the wildlife and ecosystem thereafter.

**d) Noise, vibration, odor, and visual nuisance.** Operating heavy machineries and equipment can impact the local communities with their noise, vibrations, visual nuisance, and odor emissions. To prevent public unrest, regular working hours according to local context will be strictly followed. Significant noise generating activities will be carried out in the least sensitive time periods to be determined in consultation with the barangays affected. Equipment and support facilities will be maintained in good order. Noise reduction components (e.g., mufflers) will be employed and inspected prior to the commencement of works. Noise emissions from construction equipment should not exceed 75 dBA, which is the allowable tolerance of the general public.

**Rehabilitation of water supply and distribution, development of communal rainwater catchment and improved communal sanitation systems.** The environmental impacts of the three project components, namely: a) rehabilitation the water tanks and laying of new water pipelines for the distribution network, wherever necessary; b) communal rainwater catchment; and c) improved communal sanitation system, are all deemed minimal. However, these impacts are still noted, and mitigation measures are suggested to eliminate if not minimize such impacts.

**Environmentally-responsible procurement.** This needs to be guaranteed by the project through proper planning of activities during pre-construction and design phase, ensuring environmental management plans are in-place and necessary environmental personnel are included in the earlier phases of the project to improve communication and cooperation among project stakeholders.

### 6.1.3 Possible environmental impacts during post-construction and operation phase

**Operation of high-pressure pumps.** The Sea Water Reverse Osmosis (SWRO) desalination process has a direct correlation of the operating pressure to the amount of total dissolved solids (TDS) in the raw water. The TDS of seawater along the coasts of Sibu and Sitangkai ranges between 32,000-34,000 ppm. This could entail operating the RO membranes at around a pressure of 30-40 bars, depending on the yield it is designed. At this high pressure, noise and vibrations could affect the local community much like the operations of heavy equipment during construction. Thus, a similar mitigating measures will also be suggested. In addition, selection of site location would also suggest factor in the decision. It might be prudent to construct the facility at least 1km away for nearby settlement. However, if the noise level is still above the Philippine-based threshold on the noise monitoring in the ESMP, necessary measures such as installation of noise barrier shall be implemented.

**Reject streams or effluents from seawater desalination.** The effluent salt concentrate is typically washed back into the sea, as common industry practice, by pipe dispersion through many ports or by nozzle jets. Impact of high salt concentrations in the effluent discharge is usually mitigated by dispersion or dilution of the brine to less than 1 ppt difference over small (<20m radius) area. Any residues coming from pretreatment and cleaning may be mixed with the effluent discharge, but for high concentrations of such residues, appropriate treatment and handling are necessary. Alternatively, the effluent discharge, when free from any pretreatment and chemical cleaning residues, can be studied further for potential material for salt-making. The marine ecosystem where the effluent is discharged should be monitored for its marine flora and fauna conditions and depending on the impact, appropriate actions must be pursued to ensure marine ecological balance.

There are several approaches to mitigate the environmental effects of the waste discharges. Mixing and dispersal of the discharge plume can be enhanced by installing a diffuser system, and by locating the discharge in a favorable oceanographic site which dissipates the salinity load quickly. To analyze plume spreading in a specific project site, the environmental and operational conditions should be investigated by hydrodynamic modeling, accompanied by salinity and temperature measurements for density calculations before and during operation of the desalination plant.

Negative impacts from chemicals can be minimized by treatment before discharge, by substitution of hazardous substances, and by implementing alternative treatment options. Especially biocides such as chlorine, which may acutely affect non-target organisms in the discharge site, should be replaced or treated prior to discharge. Chlorine can be effectively removed by different chemicals, such as sodium bisulfite as practiced in RO plants.

Filter backwash waters should be treated by sedimentation, dewatering and land-deposition, while cleaning solutions should be treated on-site in special treatment facilities or discharged to a sanitary sewer system. The use of alternative pretreatment methods should be considered where feasible, such as prefiltration with UF or MF membranes, or the use of subsurface intakes such as wells which naturally pre-filtrate the feedwater. This may eliminate or significantly reduce the need for chemical pretreatment.

A non-chemical treatment option is irradiation of the intake water with UV light at 200–300nm wavelength for disinfection, which damages the DNA structure of microorganisms. A major advantage of UV-light is that storage, handling, and disposal of toxic chemicals is avoided, but some highly reactive and short-lived active substances are also produced in seawater (i.e., free radicals) which may form by-products. However, to date UV irradiation has not been found to be an effective pretreatment for larger desalination plants.

To conclude, different technical options exist to mitigate environmental impacts, including advanced systems for the intake of the seawater and the diffusion of the waste products, nonchemical pretreatment options such as UF and MF, and wastewater treatment technologies. Equally or even more important than the technical options, however, is the selection of a proper site for a desalination project and the further processing of effluent brine solution for other uses (e.g., salt-making).

**Replacement of RO membranes.** Replacement of RO membranes due to end-of-life or cut short by untoward fouling leads to the storage of used membranes which are not easy to dispose or recycle. Apart from being a solid waste, it can also be a health hazard if not stored properly due to the presence of potential toxic cake inside the membrane. It should be part of the solid waste management plan the storage of such used RO membranes. Ideally, it should be stored until such a time that it can be shipped to accredited treatment facility or discarded in sanitary landfill. Other potential use of the spent membrane is to recycle them in the production of low-quality water for irrigation or similar purposes. It can also be disposed at facilities that has the capabilities and applications to convert waste to energy (e.g., pyrolysis or plasma technology).

**Chemical and chemical waste handling.** To improve the lifespan of SWRO membranes, anti-scalants are generally used during the Clean-In-Place (CIP) operations. To prevent untoward



accident or incidents involving chemicals, such as leakage, spillage and chemical mishandling, proper storage and handling of chemicals and hazardous waste shall be developed in compliance with RA 6969 – an Act to control toxic substances and hazardous wastes. In addition, chemicals should be handled by trained personnel and supervised by licensed professional. Included in the chemicals and waste chemicals management plan are contingency measures in case of chemical accidents or incidents.

**Energy impact and mitigation.** Energy use is a main cost factor in water desalination and has already been reduced by some technological innovations, such as the use of energy recovery equipment or variable frequency pumps in RO plants. A very low specific energy consumption of 2–2.3 kWh/m<sup>3</sup> has been reported for a seawater desalination plant that uses an energy recovery system consisting of a piston type accumulator and a low-pressure pump. Furthermore, to minimize impacts on air quality and climate, the potential for renewable energy use (1MWp Solar PV Power Plant in this project) is hereby explored.

**Maintenance of solar panels.** Washing of solar panels to improve its energy capture efficiency can lead to unwanted environmental impacts. Panel wash water could potentially transport contaminants, such as the discharge of zinc because of corrosion in the panel frames, into the ground water. Operational procedures to plan for panel-washing on an as needed basis, rather than routine basis. This is also recommended as frequent washing could lead to scarcity of fresh water in the island of Sitangkai. Washing is also done by water alone and detergents or chemicals for cleaning are not advised. Manual “dusting” is to be prioritized to avoid wastewater generation. These maintenance programs are necessary to avoid corrosion and the subsequent contamination of heavy metals. Thus, monitoring of the ground water to identify early signs of elevated zinc or other heavy metals is a suitable mitigating measure.

**Operation of solar pumps for water supply and distribution.** Noise and vibrations of the solar-powered pumps could affect the local community much like the operations of heavy equipment during construction. Thus, similar mitigating measures will also be suggested. However, if the noise level is still above the Philippine standards (determined by noise monitoring in this EMP), necessary measures such as installation of noise barriers and mufflers shall be implemented.

**Terrestrial flora and fauna.** Once the infrastructure is (re-)constructed, affected terrestrial flora and fauna will not be able to repopulate the occupied space, except for spaces under the elevated water tanks. However, vegetation repopulated may be dominated by invasive plants as observed in some project sites. One of the major threats currently observed is the leaking of fossil-derived fuels used for motor pumps, which may be fatal to the exposed flora and fauna and may contaminate surface and groundwater resources.

**Indirect impacts.** Subsequent to the potential loss of vegetation at the project sites, indirect impact includes natural habitat loss to few affected species relying on the vegetation for forage or breeding. It should also be noted that in close proximity of the project sites are critical habitats such as wetlands and mangrove ecosystems, which is natural habitats for many migratory species; these ecosystems may be affected by the noise, vibration, odor emissions, solid/liquid wastes left out after construction.

**Impact Assessment.** Based on the scope and size of the project, the impact footprint to the terrestrial ecosystem is small. Below is a summary of the impact assessment in terms of magnitude, significance, probability, and duration. It may be definite that there will be a permanent change in the diversity of fauna and flora in the project site. However, size of the project is small relative to the potential space of where the displaced flora and fauna can repopulate.

## 6.2 Social impacts

The gender-differentiated impacts of infrastructure projects, including for energy and water are not always immediately apparent and tend to be overlooked, rendering invisible considerations such as women’s access to land, health and safety and mobility or issues related to displacement and/or resettlement. Studies show that projects that involve resettlement, compensation or involuntary displacement, and the associated economic, social and environmental risks, often disproportionately affect women. Compensation plans may not take into account the reality of women’s limited rights to land and property, which in many cases effectively excludes them (World Bank 2018, UN Women and OHCHR 2020). Moreover, people working in the informal economy, where women are disproportionately represented, risk losing access to important resources without being adequately compensated (CIF 2017).

Taking the needs of women and men into consideration during consultations and project planning can reduce conflicts and make energy infrastructure projects more inclusive and efficient (USAID and IUCN 2018). Yet, women are often not informed about energy projects or consultation opportunities and thus left out of the project planning and design process. Discriminatory gender norms and practices may prohibit women from speaking in public spaces or voicing adverse concerns. Organizing one or more separate consultations with women or women's groups in addition to general community meetings thus constitutes a good practice to ensure that gender-based differences in needs, challenges and skills are taken into account. It may be difficult to access safe transport for consultations and their timing may conflict with unpaid care and domestic work responsibilities (IDB 2014).

Large-scale energy and water projects can lead to an increased presence of men migrant or temporary workers in the project community or the introduction of new ancillary infrastructure, such as roads, which change travel patterns and can pose potential safety risks to women (USAID 2015). Both workers and the communities in and around which energy projects take place can be affected by sexual harassment and violence, HIV transmission and other occupational health and safety issues, with women and girls particularly at risk (IUCN 2020). Embedding codes of conduct, policies and practices to prevent and protect against sexual harassment and exploitation within projects can help mitigate these impacts (World Bank 2018).

The conducted Gender assessments informs efforts to increase women's access to water and energy, which helps women engage in productive, income-generating activities and improve their educational attainment. The project will pay attention to the affordability of and barriers to obtaining that water and energy connection.

Sustainable water and energy infrastructure has the potential to be transformative by providing much needed water and energy access and reducing greenhouse gas emissions, whilst also increasing opportunities for women's empowerment, employment and gender equality.

### **6.2.1 Possible social impacts during pre-construction phase**

These are commonly associated with the resettlement of people along the pipeline routes and construction sites. It should be noted that the pipelines will be located or temporarily stored and stacked along road reserves and hence permanent relocation of domiciles or households is not foreseen. Likewise, the construction site is in an empty space in Tongmageng, where the desalination facility will be installed together with a 1 MWp solar PV power supply. The proposed pipeline routes and construction site do not encroach existing infrastructure and for that reason, the project will not lead to physical or economic displacement.

### **6.2.2 Possible social impacts during construction phase**

**Traffic Congestion.** Traffic congestion is anticipated from site-related traffic due to the presence of civil works contractor vehicles. The project sites are not located in very busy areas and will incur limited or insignificant increase in traffic and interaction between the contractor's vehicles and local traffic (motorized and non-motorized traffic). The maintenance and repair activities during the operation phase may lead to traffic snarl-ups and possible risk for accidents especially when there is little room for pedestrian access; but this is not likely to happen when enough traffic signs and infographic campaigns are done to caution the local community of these activities.

**Socio-economic Impacts.** During construction, the project will have clear benefits from the local employment scheme. The project will additionally require various skills and services which may or may not be available at the local level. The increase in employment will temporarily lead to an overall increase in income directly and indirectly. Consequently, food vendors will have new opportunities to sell their commodities to the workers of the project.

The major possible negative impact will be that the in-migration of people from different regions may have social risks which include but are not limited to increased illicit behavior and crime, increased risk in the spread of diseases, and others. However, massive in-migration is not expected during project implementation because workers will be hired within the municipality as much as possible.

**Public health and safety.** Public health in this context is the effect of project implementation on peoples' health outside the project site. Health effects on workers are covered by the Department of

Labor and Employment (DOLE) regulations. Adverse public health effects during construction are not expected because project structures are small and pollutants during operation are insignificant.

Construction workers and the general public will be exposed to safety risks and hazards brought on by the construction activities in the area. The project works will expose laborers to occupational risks during the handling of machinery, construction noise, and manual work.

Construction sites may be a source of both liquid and solid wastes. If these wastes are not well disposed of properly, these sites may become a breeding ground for disease-causing pests such as mosquitoes and rodents.

**Spread of communicable diseases.** In-migration of people (especially the professionals and highly skilled workers) from different regions may lead to behavioral influences which may increase the spread of diseases in the area.

**Occupational health and safety risks.** Construction workers will be exposed to safety risks and hazards brought by the construction activities in the area. The project works will expose workers to occupational risks with the handling of machinery, construction noise, and electromechanical works. At the concrete mixing plant, the exposure of human skin to cement may lead to damage of the skin. Construction activities such as bush clearing, materials delivery, trench excavation, concrete mixing, and so on will generate a lot of dust which may affect the person's respiratory system.

Any form of harassment (e.g., sexual, physical, etc.) between project workers is another occupational health and safety risk that could happen during the project implementation especially when there is insufficient sensitization of workers against its prohibitions as well as the absence of reporting and disciplinary measures.

**Sexual exploitation and abuse (SEA) of community members by project workers.** This impact refers to sexual exploitation and abuse committed by project staff or workers against a certain member of the community and represents a risk at all stages of the project implementation.

**Gender-based violence (GBV) at the community level.** GBV constitutes acts of gross misconduct and are grounds for sanctions, penalties, and/or termination of employment. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measure to reduce the potential for increased tensions due to females receiving funds. GBV-related risks also include the safety and security issues related to the delivery of water and sanitation services.

**Violence against women and violation of children's rights by contractor and labor force on site.** Violence against women and children (VAWC) refers to physical, sexual, emotional, and/or psychological harm, negligent treatment of women and or minor children, including exposure to risks that results in actual or potential harm to the women's or child's health, survival, development, or dignity in the context of a relationship of responsibility, trust, or power. This includes using children for profit, labor, sexual gratification, or some other personal or financial advantage. It also includes other activities such as using computers, mobile phones, video, digital cameras, or any other media to exploit or harass children or to access child pornography.

**Labor Influx.** The project is expected to stimulate minimal in-migration. Several instances of the project that could prompt in-migration can be as follows:

- Local labor requirements: Construction of the project will employ a significant number of people. In practice, the level of construction employment available to local workers will be focused on skilled, unskilled, and lower-skilled workers. In-migration may often happen for professionals and skilled work force for short periods of time.
- Project demand for goods and services: The scale of the project may generate high expectations around opportunities associated with the supply chain. Demand for goods and services in the community may be high during the construction phase.
- Operation of construction sites: Construction works are also likely to act as a magnet for people and are likely to attract some in-migrants.

**Gender Equality and Women's Empowerment.** There is a need to promote gender equality in all aspects of economic development and more so in the construction phase. The contractor should uphold principles of gender equality through compliance with gender inclusivity requirements in the hiring of workers.

**Service Delivery Impacts.** The construction activities will cause disruption of services such as water supply and transportation within the project site. Excavation of trenches and laying down of the water pipes may cause disruption of transport within the project area. Trucks with heavy loads of construction materials may damage roads and footpaths during the construction process.

**Liability for loss of life, injury, or damage to property.** Some of the construction activities may lead to accidents that may be mild or fatal depending on various factors. During the implementation

of the proposed project, accidents could be due to negligence on the part of the workers, machine failure or breakdown, or accidental falls into the pipeline trenches. These can be reduced through proper work safety procedures.

**Cultural and lifestyle change and impact on cultural resources.** The project is not expected to affect the lifestyle of the residents in the island. In addition, there are no cultural resources at the project sites that may be affected during and after the project implementation.

**Threat to delivery of basic services and resource competition.** The project implementation is not expected to disrupt the delivery of basic services in the municipality; rather it improves access of the residents to potable water. Resource competition is not expected either because most of the identified groundwater resources are publicly owned. Private water retailers in the area have also their own sources of water which are not accessible to the public.

### 6.2.3 Possible social impacts during post-construction and operation phase

The establishment of an adequate water supply and distribution system will be beneficial to the local community, however, with it comes the increase in the generation of solid and liquid wastes, which should be managed properly. This may also lead to the increase in local labor force on a permanent basis, who will operate and maintain the water supply and distribution system.

### 6.2.4 Assessment of key impacts and mitigating measures

**Displacement of settlers.** There are no settlers displaced because there are no households inside the project sites and locations (e.g., dug wells, desalination and solar power facilities, pipeline routes, etc.).

**In-migration.** In the context of EIA, in-migration refers to the influx of people at a project area during implementation and may stay permanently. In-migration is not expected during project implementation because workers will be hired within the municipality or locality.

**Cultural and lifestyle change and impact on cultural resources.** The project is not expected to affect the lifestyle of the residents in the island. There are no cultural resources at the project sites that may be affected during and after the project implementation.

**Threat to delivery of basic services and resource competition.** The project implementation is not expected to disrupt the delivery of basic services in the municipality; rather it improves access of the residents to potable water and lessens the financial burden of the community in importing potable water from neighboring islands.

#### **Threat to public health and safety.**

**Public health.** Public health in this context is the effect of project implementation on peoples' health outside the project site. Health effects on workers are covered by DOLE regulations. Adverse public health effects during construction are not expected because project structures are relatively small and pollutants during operation are insignificant, aside from the fact that major physical infrastructures are located away from major communities and residential areas.

**Generation of municipal solid waste (MSW).** MSW will be generated during project implementation. Construction solid wastes such as excavated materials and municipal wastes generated by workers may accumulate if not properly managed. Management of solid wastes is included in the proposed ESMP (combined EMP and SMP).

**Impact on the water quality.** Generated brine during project operation can contribute to water pollution if not properly managed. Management of this effluent solution from the desalination facility is included in the proposed EMP.

#### **Generation of local benefits from the project**

**Employment opportunities.** Employment opportunities for the host community are expected during project implementation. To enhance the employment opportunities brought by the proposed project, the proponent shall coordinate with the LGU regarding the hiring of workers. Local labor employment will be maximized as much as possible.

**Increased tourist traffic.** One of the issues besetting tourists on the island is the lack of reliable potable water source. Tourists must bring their own potable water from the mainland or purchase expensive bottled water on the island. An increase in the tourist traffic on the island is expected and possibly extend their stay because the project will provide cheap, reliable, and clean potable water, managed sanitation, and hygiene practices, improved solid wastes management, to tourists and residents alike.

**Additional LGU revenues.** The project will contribute to the incomes of the municipality from taxes, fees, and the corresponding increase in economic activities. The proponent should ensure prompt payment of taxes and other legal fees.

To summarize the assessment and evaluation results, the Leopold matrix<sup>11</sup> is adapted to **assess the over-all environmental and social impact of the project across all conditions that are deemed to be affected.** Table 6.1 shows the assessment and evaluation results based on the environmental (physical and biological) and social impacts that the project will likely cause, as discussed above. Along each impact, specific parameters are indicated, e.g., soil, water, flora, fauna, etc. A common scale of 1-10 is applied to all assessments in terms of **Magnitude, Significance, Probability, and Duration** of impact during the construction and post-construction and operation phases. The legend indicated in Table 6.1 describes the meaning of each assessment scale.

**From Table 6.1, the over-all impact is seen to be “tolerable” during the construction phase and is further envisioned to reduce to “negligible” during the post-construction and operation phases. Furthermore, the envisioned negative impacts will improve to become positive in the long-term mainly due to the intervention actions implemented by the project.**

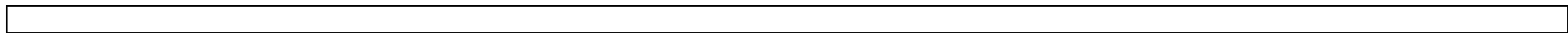
---

<sup>11</sup> Leopold LB et.al.,1971. A Procedure for Evaluating Environmental Impact. Geological Survey Circular 645, Washington USA, 1971.



**Table 6.1. Overall Summary – Evaluation of Environmental and Social Impact of the Project**

Impact		Construction Phase				Post-construction and Operations Phase					
		Magnitude	Significance	Probability	Duration	Magnitude	Significance	Probability	Duration		
Environmental and Social Conditions	PHYSICAL	SOIL	Soil quality	4	3	3	3	1	1	1	2
			Erosion	3	3	3	3	2	2	1	2
			Geomorphology	2	2	2	2	1	1	1	1
		WATER	Coastal zones	4	4	4	4	3	2	2	2
			Subsurface/ground water	4	4	4	4	3	3	3	3
			Sea quality	4	4	4	4	3	3	3	3
		AIR	Air quality	1	1	1	1	1	1	1	1
			Odors and Noise	2	2	2	2	1	1	1	1
		BIOLOGICAL	FLORA	Forests and Crops	5	5	5	5	2	2	2
	Wetlands			3	3	3	3	1	1	1	1
	Seagrass			5	5	5	5	2	2	2	2
	FAUNA		Mammals	5	5	5	5	3	3	3	3
			Birds	5	5	5	5	1	1	1	1
			Fish	5	5	5	5	3	3	3	3
			Other vertebrates	5	5	5	5	3	3	3	3
	ECOSYSTEMS		Invertebrates	5	5	5	5	3	3	3	3
			Ecosystem quality	4	4	4	4	1	1	1	1
			Ecosystem destruction	5	5	5	5	2	2	2	2
	SOCIAL	LAND USES	Rural	3	3	3	3	1	1	1	1
			Fisheries	2	2	2	2	1	1	1	1
			Urban/Industrial	1	1	1	1	1	1	1	1
			Recreational	1	1	1	1	1	1	1	1
		PATRIMONY	Landscape	2	2	2	2	1	1	1	1
			Historical/Cultural	2	2	2	2	1	1	1	1
			Wilderness quality	3	3	3	3	1	1	1	1
		SOCIAL	Population and its density	4	4	4	4	1	1	1	1
			Employment	1	1	1	1	1	1	1	1
Hazards			4	4	4	4	1	1	1	1	
			Gender								
			Agea								
<b>AVERAGE</b>			<b>3.36</b>	<b>3.32</b>	<b>3.32</b>	<b>3.32</b>	<b>1.64</b>	<b>1.61</b>	<b>1.57</b>	<b>1.64</b>	
<b>LEGEND: Magnitude:</b> Scale 1-10 (highly tolerable to intolerable effect); <b>Significance:</b> Scale 1-10 (least significant with negligible/limited impact to highly significant/very impactful) <b>Probability:</b> Scale 1-10 (Impact is least probable to impact very highly probable); <b>Duration:</b> Scale 1-10 (short term within the period of activity to long term)											



## 7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This chapter provides some details on the management initiatives and the measures to be implemented during the pre-construction, construction, and operational phases of the project. The ESMP has 3 main components, which are presented, discussed, and tabulated below.

### 7.1 Environmental Management Plan (EMP)

#### 7.1.1 Environmental Mitigation Measures

This section lists the potential impacts of the project and proposes the necessary mitigation measures. Also presented are the roles and responsibilities for implementation and for supervision, monitoring measures to ensure implementation, and cost estimates. Such mitigation measures are presented during the various phases of the project (pre-and construction, post-construction, and operation phases (see Table 7.1).

#### 7.1.2 Environmental Monitoring Program

This section prepares a detailed plan to monitor the implementation of mitigating measures and continuously monitor the impacts of the project during construction and operation. Details on the parameters to be monitored, monitoring locations, and frequency are provided as well as the roles and responsibilities for implementation and supervision, and cost estimates. The standards, guidelines, or targets for performance measurement for the monitoring program are also specified. This may include socio-economic measurements in cases where re-settlement is required (see Table 7.2)

#### 7.1.3 Institutional Arrangements

This section reviews the authority and capability of institutions at local and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental impact assessment can be implemented. The costs and sources of funds for the proposed measures and any training requirements for capacity building in the field of environmental safeguards are indicated as estimates (see Tables 7.3-7.4).

### 7.2 Social Management Plan (SMP)

For this project, the SMP is designed to provide general guidance on the monitoring requirements of the ESMP. Monitoring will be implemented during the pre-construction, construction, and operational phases of the project. It will focus on the actual implementation of the mitigation measures contained in the SMP and the status of compliance with the UNIDO safeguard policies. The SMP has 3 main components, namely: (1) Social Mitigation Measures, (2) Monitoring Program, and (3) Institutional Arrangements, the background details of which are included in **Annex E**.

#### 7.2.1 Social Mitigation Measures

This section lists the potential impacts and proposes the necessary social mitigation measures, including the roles and responsibilities for implementation and for supervision, monitoring measures to ensure implementation, and cost estimates. Such mitigation measures are presented for both the construction and operation phases of the project. Please refer to Table 7.5 for details.

#### 7.2.2 Social Monitoring Program

This section prepares a detailed plan to monitor the implementation of mitigating measures and continuously monitor the impacts of the project during construction and operation. Details on the parameters to be monitored, monitoring locations, and frequency are provided, as well as the roles and responsibilities for implementation and supervision, and cost estimates. The standards, guidelines, or targets for performance measurement for the monitoring program are specified as well. Please refer to Table 7.6 for details.

#### 7.2.3 Institutional Arrangements

This section reviews the authority and capability of institutions at local and national levels and recommends steps to strengthen them so that the monitoring plans in social impact assessment can be implemented. The costs and sources of funds for the proposed measures and any training requirements for capacity building in the field of social safeguards are indicated as estimates. The plans involving institutional arrangements are presented in Tables 7.7-7.8 below.

*Table 7.1. Environmental Mitigation Measures*

#	Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibilities (Implementation & Supervision)	Cost Estimates (USD)	Comments (e.g., secondary impacts)
<b>1. Design and pre-construction phase (Rehabilitation of water sources, tanks, and distribution systems for each barangay)</b>						
1A	Water Pumping test	Over-extraction could lead to saltwater intrusion in fresh ground water resources	(1) Determination of ground water capacity through pumping test; and (2) Water extraction should not go beyond the limit of ground water capacity.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 10,000	USD 2,000 per site at 5 sites only
					SITANGKAI 0	May not be applicable due to already brackish water
1B	Land Acquisition	Climate Change Vulnerability	(1) Planning new infrastructure at a suitable elevation above the current high tide level (utilizing accurate topographic survey); (2) Must be near a shoreline and must be relatively close to the intended consumers of the desalinated water; (3) Must be near to a body of water where strong and fast exchanges of sea/ocean currents to allow proper brine dilution or dispersion; and (4) Must be near to a back-up power generation facility to allow uninterrupted operation of water supply. (5) Take into consideration gender dimensions	<b>Supervision:</b> UNIDO, PMU, gender expert <b>Execution:</b> PMU, Contractor	SIBUTU 0	Not applicable.
					SITANGKAI 10,000	Cost may be waived when land is donated as counterpart of LGU.
1C	SWRO facility and Solar PV Power Plant Design	Climate Change Resiliency	(1) Ensuring new infrastructure is designed to withstand extreme weather events, such as sea water inundation.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU - 0	Not applicable.
					SITANGKAI - 0	Included in SWRO costs
1D	Storm water design (particularly in the 0.8-1 ha Solar Farm)	Poor design leading to flooding, ponding, and erosion	(1) Avoid land contouring; and (2) Incorporate the use of vegetation, preferably native grasses, and ground cover in storm water design.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU - 0	Not applicable.
					SITANGKAI 0	Groundwater contamination (Included in construction costs)

1E	Engineering design of water treatment & supply distribution systems	Leaks of diesel or gasoline motor pumps could lead to ground water contamination	(1) All the shallow wells in Sibutu & Sitangkai, are around half-a-kilometer away from the nearest coast, where the electrical transmission lines run along. Water pumping is carried out using diesel or gasoline-powered motor pumps which are prone to oil and fuel leakages, which can easily enter the ground water resource. Replacement of current motor pumps to solar-powered pumps can eliminate this environmental impact and can avoid GHG emissions; and (2) In designing the water distribution system, it is recommended to use solar booster pumps to augment the water pressure in the pipelines.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 0	(Cost included in construction costs) Diesel- or gasoline powered motor pumps contribute to air pollutants, causing lower air quality. Potential abatement of greenhouse gas emissions using renewable solar pumps can be done.
					SITANGKAI 0	
1F	Securing ECC permits	Non-compliance to environmental laws	(1) Prepare the EIA study for submission, together with application documents, to BARMM/MENRE.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 5,000 SITANGKAI 5,000	(Includes costs for scoping and site surveys by MENRE, application and review fees.)
2	Design of communal rainwater catchment systems	Tapping additional water sources as over-extraction from ground sources could lead to saltwater intrusion	(1) Design a communal rainwater catchment system to augment water supply and prevent over-extraction of ground water resources; and (2) Use of solar-powered pumps to improve water supply and distribution systems	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 0 SITANGKAI 0	Potential abatement of GHG emission using solar-powered pumps.  Costs included in the total systems costs.
3	Design of communal sanitation systems equipped with appropriate coastal drain field	Hanging latrines allows the direct disposal of sewage and contaminates seawater	(1) Design a communal sanitation system equipped with appropriate septic tanks good for 8-10 households with provision for final effluent pumping into a properly designed coastal drain field.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 0 SITANGKAI 0	Potential abatement of GHG emission using solar-powered pumps. Costs included in the total systems costs.
4	Site and land preparation; done together with land acquisition (1B)	Disturbance to terrestrial flora and fauna	(1) Prohibition of burning vegetation, residual bushes and grasslands when clearing planting sites; (2) Only cutting flora which are a direct obstacle to project infrastructure works; (3) Caring for existing habitat for terrestrial flora and fauna; (4) Workers are not allowed to disturb terrestrial flora and fauna around the project site locations.		SIBUTU - 0 SITANGKAI - 0	Potential fire hazard if dried vegetation is not removed and disposed of properly; emission of GHGs if vegetation is burned. Costs included in construction costs and land acquisition costs (if there is any).



2. Construction Phase (Rehabilitation of water supply and distribution systems; development of communal rainwater harvesting system; & improved sanitation facilities)						
5	Equipment and material mobilization	Generation of air pollutants, noise, order, visual nuisance	(1) Transporting the materials to the location using operation-worthy vehicles that passed the MVIS (Motor Vehicle Inspection System).	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 0  SITANGKAI 0	Health Hazard: Difficulty in Breathing due to dust and suspended particulate matter.
			(1) Heavy equipment and materials mobilization use construction access road of Tongmageng which is relatively quiet and away from settlements; (2) Closing the tanks of transporting material vehicle with tarps; (3) Developing of washhouse to clean transporting vehicle wheels before out from project site location; (4) If there are materials spills on the passing road from construction materials mobilization, it will be cleaned as soon as possible; and (5) Flushing the road periodically.			Low Visibility: due to suspended particles.  <i>Included in construction costs.</i>
6A	Site and Land Preparation	Disturbance to terrestrial flora and fauna	(1) Prohibition of burning vegetation and residual bushes and grasses when clearing planting sites; (2) Only cutting flora which are a direct obstacle to project infrastructure works; (3) Making new habitat (such as plant mangrove) for terrestrial fauna and maintain that habitat; and (4) Workers are not allowed to disturb terrestrial fauna around project site location.		SITANGKAI 0	Potential fire hazard if dried vegetation is not removed and disposed properly; emission of GHGs if vegetations are burned. <i>Included in construction costs.</i>
6B	Ground excavation and laying of pipes; presence of workers	Groundwater and surface water contamination	(1) Providing portable toilets and wash area in the project site and construction/provision of wastewater treatment facility such as septic tank/digester and (2) Good housekeeping practices	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SIBUTU 5,000  SITANGKAI 0	Health Hazard; Increased cases of water-borne diseases
		Land and sea/ocean pollution due to solid wastes	(1) Proper implementation of solid waste segregation at source in accordance with RA 2003; (2) Prepare a solid waste management plan; (3) Contain all stored wastes in secure receptacles, avoiding littering and runoff; (4) No waste is to be burned; (5) Recycling of materials such as wood, metal, plastics, and concrete; and (6) Biodegradables collected and composted.			Health hazard to humans, local wildlife, and marine life. <i>Included in construction costs.</i>
6C	Basecamp Operations	Groundwater and Surface Water Contamination	(1) Providing portable toilets and wash area in the project site and construction of wastewater treatment facility such as Septic Tank/digester; (2) Providing rainwater catchment system to harness rainwater and augment the water supply for construction	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	SITANGKAI 0	<i>Included in construction costs.</i>  Health Hazard: Increase cases of water-borne diseases

			and human activities; and (3) Recycling of wash water for flushing purposes.			
		Land and Sea/Ocean Pollution	(1) Proper Implementation of segregation at source and recycling in accordance with RA9003; (2) Prepare a solid waste management plan; (3) Contain all stored wastes in secure receptacles within construction sites and the compound, avoiding littering and runoff; (4) No waste is to be burned; (5) Recycling of Materials such as wood, metal, and concrete; and (6) Biodegradables collected and composted.			Health Hazard to Humans, Local Wildlife, and Marine life.  <i>Included in construction costs.</i>
7	Noise, odor, vibration, and visual nuisance	Noise, odor, vibration, and visual nuisance impacts on local communities	(1) Implement local regular working hours (e.g., 7am-5pm, Monday to Friday, and Saturdays if agreed upon by stakeholders and the contractor); (2) Significant noise generating activities will be carried out in the least sensitive time periods to be determined in consultation with the barangays affected; (3) Equipment and facilities will be maintained in good order. Noise reduction components (e.g., mufflers) will be inspected prior to the commencement of works; (4) Noise emissions from construction equipment should not exceed 75 dBA; and (5) Implement good housekeeping practices.	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	<b>SIBUTU</b> 0	Public unrest. <i>Cost included in construction costs.</i>
<b>3. Post-construction and operation and maintenance phase</b>						
8	Equipment and material mobilization	Generation of air pollutants, noise, order, visual nuisance	(1) Transporting the materials and equipment out of the project sites using operation-worthy vehicles that passed the MVIS (Motor Vehicle Inspection System).	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	<b>SIBUTU</b> 0 <b>SITANGKAI</b> 0	Cost included in construction costs.
9A	Operation of Pumps	Noise pollution	(1) Shallow wells are located about 1km from nearby settlement of people; and (2) If the noise level is above the Philippine standard based on the noise monitoring system and it is derived from the operation of pumps, necessary measures such as installation of noise barrier shall be done.	<b>Supervision:</b> PMU <b>Execution:</b> Water Service Provider (Water District)	<b>SIBUTU</b> 1,000 <b>SITANGKAI</b> 1,000	Public unrest. Cost included in Operations and Maintenance (O&M) costs.
9B	Operation of high-pressure pumps for	Noise pollution	(1) Site location is at least 0.5 km from nearby settlement of people; and (2) If the noise level is above the Philippine standard	<b>Supervision:</b> PMU <b>Execution:</b> Water Service	<b>SITANGKAI</b> 1,000	Public unrest. Cost included in O&M costs.

	the desalination facility		based on the noise monitoring and it is derived from the operation of pumps, necessary measures such as installation of noise barrier shall be conducted.	Provider (Water District)		
10	Disposal of brine reject to offshore site; study on alternative use of brine solution	Decrease in seawater quality	(1) Disposal of brine should be to the direction where there is minimal marine flora and fauna; (2) Preferable discharge location near the point where sea current is fast to aid dispersion; (3) Distribute the brine reject through many ports of discharge pipe; (4) Jet or nozzle the brine out; and (5) Conduct study on alternative use of brine solution, e.g., salt-making	<b>Supervision:</b> PMU <b>Execution:</b> Water Service Provider (Water District)	<b>SITANGKAI</b> 50,000	Possible groundwater contamination due to pipe leakage. ( <i>Feasibility and experimental pilot study</i> ); disposal system costs included in O&M costs.
11	Presence of anti-scalants during CIP operations	Accidental chemicals leakage and chemical storage mishandling	(1) Proper storage and handling of chemicals according to RA 6969. A waste management plan to be prepared prior to commissioning. This will include protocols for avoiding, reducing, recycling, and disposing of waste, specific procedures for hazardous waste; (2) Chemicals should be handled by trained personnel; and (3) Contingency measures in place in case of chemical spillage of accidents.	<b>Supervision:</b> PMU <b>Execution:</b> Water Service Provider (Water District)	<b>SITANGKAI</b> 5,000	Health hazard: potential eye and skin irritant. <i>Cost included in O&amp;M costs.</i>
12	Replacement of RO membranes due to end-of-life or cut short by fouling.	Disposal of used RO membranes	(1) Store used RO membranes until such a time that it can be shipped for landfill disposal; (2) Store used RO membranes for recycling purposes (the production of low-quality water for irrigation for example); and (3) Store used RO membranes for waste to energy applications (e.g., pyrolysis).	<b>Supervision:</b> PMU <b>Execution:</b> Water Service Provider (Water District)	<b>SITANGKAI</b> 100,000	Health hazard, if not stored properly. (Cost included in O&M costs)
13	Solar Panel washing	Panel wash water transporting contaminants into groundwater source.	(1) Operational procedures to plan for panel-washing on an as needed basis, rather than routine basis; (2) No detergents or chemicals to be used in cleaning (water only); and (3) Manual "dusting" to be prioritized to avoid producing wastewater.		<b>SITANGKAI</b> 1,000	Scarcity of fresh water on the island. (Cost included in O&M costs)
14	Corrosion of Panel frames	Discharge of zinc to ground and groundwater resource contamination	(1) Maintenance program to avoid corrosion; and (2) Monitoring of ground water to identify early signs of elevated zinc.		<b>SITANGKAI</b> 1,000	Possible adverse effects on the ecosystem. (Cost included in O&M costs)
15	Hydrological studies	Conduct of longitudinal hydrological studies	(1) Regular studies, monitoring, assessment and evaluation of potential water quality and quantity for long -term periods		<b>SITANGKAI</b> 30,000/year	Potential adverse effect on over-extraction of groundwater (Included in Strategic Business

							Plan)
--	--	--	--	--	--	--	-------

*Table 7.2. Environmental monitoring program*

#	Project Activity	Proposed Mitigation Measures	Parameters to be monitored	Location	Measurements (incl. methods & equipment)	Frequency of Measurement	Responsibilities (incl. Review and reporting)	Cost (equipment & individuals) (USD)
<b>1. Design and pre-construction phase (SIBUTU:</b> Rehabilitation of water sources, tanks, and distribution systems for each barangay; and <b>SITANGKAI:</b> Rehabilitation of existing water supply & distribution; development of desalination facility with solar PV power supply)								
1A	Pumping test	(1) Measures the ground water well capacity to determine the extraction limit and prevent saltwater intrusion into the ground water resource.	Well capacity	Identified shallow wells as water sources of barangays	Three consecutive days of pumping water and measurements of the level of ground water resource.	Prior to commissioning	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	10,000 - <b>SIBUTU</b> (USD 2,000 per site for another 5 sites) 0 - <b>SITANGKAI</b> (May not be applicable due to brackish water)
1B	Land Acquisition	(1) Planning new infrastructure at a suitable elevation above the current high tide level	Complete site Inspection with checklist	Solar PV power plant	Design Report Site Survey	Prior to Commissioning		10,000 - <b>SITANGKAI</b> (May be included in construction costs)
1C	SWRO facility and Solar PV Power Plant Design	(1) Ensuring new infrastructure is designed to withstand extreme weather events	Complete site Inspection with checklist	Solar PV power plant	Design Report Site Survey	Prior to Commissioning		0 - <b>SITANGKAI</b> (May be included in construction costs)
1D	Storm water design (particularly in the 0.8-1 ha Solar Farm)	(1) Avoid land contouring; Incorporate the use of vegetation, preferably native grasses, and ground cover in storm water design.	Complete site Inspection with checklist	Solar PV power plant	Design Report Site Survey	Prior to Commissioning		0 - <b>SITANGKAI</b> (May be included in construction costs)
1E	Engineering design of water treatment and supply distribution systems	(1) Integration of solar-powered pumps into the water supply and distribution system.	Complete design review and site inspection with checklist	Identified barangays in Sibutu and Sitangkai	(1) Design Report (2) Site Survey (3) Completed inspection checklist	Prior to commissioning	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b> (May be included in dev't & construction costs)

1F	Securing ECC permits	Prepare the EIA study for submission, together with application documents, to BARM/MENRE	None; complete documentation, final ECC approval	Sibutu and Sitangkai	(1) EIA Report	Prior to commissioning	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	5,000 - <b>SIBUTU</b> 5,000 - <b>SITANGKAI</b>
2	Design of communal rainwater catchment systems	(1) Design a communal rainwater catchment system to augment water supply and prevent over extraction of ground water resource.	Complete design review and site inspection with checklist	Identified barangays in Sibutu and Sitangkai	1) Design Report 2) Site Survey 3) Completed inspection checklist	Prior to commissioning	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b> <i>(May be included in dev't &amp; construction costs)</i>
3	Design of communal sanitation systems	(1) Design a communal sanitation system equipped with appropriate septic tanks good for 8-10 households with provision for final effluent pumping into a properly designed coastal drain field.	Complete design review, site inspection with checklist	Identified barangays in Sibutu and Sitangkai	(1) Design Report 2) Site Survey 3) Completed inspection checklist	Prior to commissioning	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b> <i>(May be included in dev't &amp; construction costs)</i>
4	Site and land preparation	(1) Prohibition of burning vegetation, residual bushes and grasslands when clearing planting sites; (2) Only cutting flora which are a direct obstacle to project infrastructure works; (3) Caring for existing habitat for terrestrial flora and fauna; and (4) Workers are not allowed to disturb terrestrial flora and fauna around the project site.	Complete process review, site inspection with checklist	Identified barangays in Sibutu and Sitangkai	(1) Process Review Report 2) Site Survey 3) Completed inspection checklist	Prior to commissioning		0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b> <i>(May be included in dev't &amp; construction costs)</i>
<b>2. Construction Phase (Rehabilitation of water supply and distribution systems; development of communal rainwater harvesting system; &amp; improved sanitation facilities)</b>								
5	Equipment and material mobilization	(1) Transporting the materials to the location using operation worthy vehicle that passed the MVIS (Motor Vehicle Inspection System).	Concentration of air pollutants and TSP not to exceed air quality standard in RA-8749-IRR-	Around the site locations in Sibutu and Sitangkai	Conducting air quality laboratory analysis, then the results compared with the air quality standard of RA 8749	Twice during construction phase, or as regularly as appropriate	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b> <i>(May be included in dev't &amp; construction costs)</i>

			DAO-2000-81					
6A	Site and land preparation	(1) Providing portable toilets and wash area in the project site and construction/provision of wastewater treatment facility such as septic tank/digester; and (2) Good housekeeping practices	Monitoring of E. coli levels in nearby groundwater, shallow well, and mangrove forests	Nearby ground water sources and mangrove forest	Sampling and laboratory Analysis	Twice (before and after construction)	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b>  (May be included in dev't & construction costs)
6B	Ground excavation and laying of pipes and basecamp operations	(1) Proper Implementation of segregation at source in accordance with RA2003.	Volume of wastes/category	Facility site location	Records of disposal date and volume of waste per category	Weekly during construction		
7	Noise, odor, vibration, and visual nuisance	(1) Implement local regular working hours; (2) Noise generating activities will be carried out in the least sensitive time periods to be determined in consultation with the barangays affected; (3) Noise reduction components will be inspected prior to the commencement of works; and (4) Implement good housekeeping practices	Noise emissions from construction equipment should not exceed 75 dBA.	Nearby settlements of the facility in Sibutu	Monitoring of sound decibels during construction and operations phases	Weekly during construction and operation phases		
<b>3. Post-construction and operation and maintenance phase</b>								
8	Equipment and material mobilization	(1) Transporting the materials and equipment out of the project sites using operation-worthy vehicles that passed the MVIS (Motor Vehicle Inspection System).	Noise emissions from construction equipment should not exceed 75 dBA.	Nearby settlements of the facility in Sibutu and Sitangkai	Monitoring of sound decibels during construction and operations phases	Weekly during construction and operation phases	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor	0 - <b>SIBUTU</b> 0 - <b>SITANGKAI</b>  (May be included in dev't & construction costs)
9	Operation of Pumps	(1) Doing the necessary measures such as installation of noise barrier (mufflers) shall be done.		Nearby Settlements of the facility in Sibutu and Sitangkai	Conducting noise laboratory analysis, then compared to standards in accordance with Article 696 of the Civil Code	During construction and Operation Phase: Weekly		



**Table 7.3. Institutional strengthening and training activities for implementation**

#	Institutional Strengthening Activity	Position(s)	Scheduling	Responsibilities	Cost Estimates (USD)
1	Environmental and Social Safeguards Policies and Procedures (ESSPP)	Project manager; EMSP Officers; technical staff; LGU beneficiaries	During project implementation	<b>Supervision:</b> UNIDO, PMU <b>Execution:</b> PMU, Contractor, Water Service Provider (Water District)	1,000 – SIB   1,000 – SIT
2	Environmental and Social Management Planning and Implementation				1,000 – SIB   1,000 – SIT
3	Good Sanitation Programs and Practices; WASH Training Programs				2,000 – SIB   2,000 – SIT
4	Municipal Solid Wastes Management Planning and Implementation				1,000 – SIB   1,000 – SIT
5	Good Practices in Monitoring and Evaluation of Projects				1,000 – SIB   1,000 – SIT
6	Water Governance and Effective IWRM Management				5,000 – SIB   5,000 – SIT
7	Energy Efficiency and Conservation (EEC); Water Conservation				3,000 – SIB   3,000 – SIT

**Table 7.4. Training activities for implementation**

#	Training Activity	Participants	Types of Training	Contents (modules, etc)	Scheduling	Cost Estimates (USD)
1	Environmental and Social Safeguards Policies and Procedures (ESSPP)	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	ESSPP Modules based on AF & UNIDO ESSPP Policies and Guidelines	During project implementation	2,000 – SIB   2,000 – SIT
2	Environmental & Social Management Planning and Implementation			EMSP Modules		2,000 – SIB   2,000 – SIT
3	Good Sanitation Programs and Practices; WASH Training Programs			WASH Program modules		2,000 – SIB   2,000 – SIT
4	Municipal Solid Wastes Management Planning and Implementation			MSWM Standards and Guidelines		5,000 – SIB   5,000 – SIT
5	Good Practices in Monitoring & Evaluation of Projects			M&E Standards and Guidelines		2,000 – SIB   2,000 – SIT

#	Training Activity	Participants	Types of Training	Contents (modules, etc)	Scheduling	Cost Estimates (USD)
6	Energy Efficiency and Conservation (EEC); Water Conservation			EEC Strategies and Approaches; Water Conservation Methods		5,000 – SIB   5,000 – SIT

*Table 7.5. Social Mitigation Measures*

Project Activity	Potential Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities (Implementation & Supervision)	Cost Estimates (USD)	Comments (e.g., secondary impacts)
Pre-Construction Phase	Loss of structures due to the laying of pipelines within the road reserve	<ul style="list-style-type: none"> <li>Conduct community-wide consultation with direct stakeholders (including all gender-groups).</li> <li>Identify the owners and the type of structures that will be affected by the project and settle the matter amicably, prepare compensation agreement packages, if applicable. The compensation will be done in accordance with the Resettlement Action Plan (RAP), if there is any and if applicable. Consider gender dimensions since there might be gender-based discrimination with regards to land ownership.</li> </ul>	<b>Supervision and Execution:</b> UNIDO, PMU; gender expert <b>Partner:</b> Host LGU (municipal and barangay levels)	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Loss of livelihoods due to the laying of pipelines within the road reserve	<ul style="list-style-type: none"> <li>Conduct valuation and compensate the loss of livelihoods during the project implementation in accordance with the RAP, if applicable;</li> <li>Facilitate amicable settlement with affected households and offer local jobs when suitable</li> <li>Take into consideration gender dimensions, such as the impact on different gender-groups.</li> </ul>	<b>Supervision and Execution:</b> UNIDO or PMU; gender expert <b>Partner:</b> Host LGU (municipal and barangay levels)	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Climate change and natural hazards	<ul style="list-style-type: none"> <li>Plan new infrastructure at a suitable elevation above the current high tide level and ensure it is designed to withstand extreme weather events</li> <li>Take into consideration that gender-differentiated impacts and vulnerabilities of climate change and address them.</li> </ul>	<b>Supervision and Execution:</b> UNIDO or PMU; gender expert <b>Partner:</b> Host LGU (municipal and barangay levels)	500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
Construction Phase	Traffic Congestion	<ul style="list-style-type: none"> <li>Provide and implement a traffic management plan;</li> <li>Provide temporary road signs to indicate ongoing works;</li> <li>Choose suitable traffic routes to reduce the impact in the neighborhood;</li> <li>Ensure that there is no interference with traffic through control, designated parking, speed limits, and even hiring a banks man.</li> <li>Address gendered needs and priorities.</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor <b>Partner:</b> Host LGU (municipal and barangay levels)	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Construction materials and aggregates impacts	<ul style="list-style-type: none"> <li>Local aggregates, if required, can be sourced in the community</li> <li>Canvas for local suppliers of the needed construction materials and aggregates</li> <li>Take into consideration gender dimensions, e.g. whether certain material is needed by women, can material be purchased from women so women entrepreneurs can equally benefit, etc.</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor	500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>

	Socio-economic impacts	<ul style="list-style-type: none"> <li>● Hire unskilled and skilled labor from the local women and men, if available;</li> <li>● Provide additional training to women and youth or other underrepresented gender-groups so they are skilled labor;</li> <li>● Use of manual labor during excavation &amp; construction works if possible;</li> <li>● Prepare a labor influx plan to manage it</li> <li>● Enforce and maintain a code of conduct for employees.</li> <li>● Take into consideration and address gender dimensions</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor</p>	<p>500 (SIBUTU)  500 (SITANGKAI)</p>	<p><i>(Included in development &amp; construction costs)</i></p>
--	------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------	------------------------------------------	------------------------------------------------------------------

Social conflict between local and non-local workers	<ul style="list-style-type: none"> <li>● Provide information about the culture, tradition, and other social factors to be considered in Sitangkai and Sibutu</li> <li>● Enforce Code of Conduct (COC) for employees</li> <li>● Address gender based discrimination, harassment, violence, etc.</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor	500 (SIBUTU) 500 (SITANGKAI)	(Included in development & construction costs)
Noise from construction	<ul style="list-style-type: none"> <li>● Restrict the working hours to the standard working hours in the country (8AM - 5PM) from Monday to Saturday; make arrangements agreeable by public, especially those most affected (e.g. it might be women and children who are at home and most affected during times of construction, while men are on the sea or another workplace)</li> <li>● Use vehicles, plant, and equipment that comply with international standards for construction equipment noise emission</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor	500 (SITANGKAI)	(Included in development & construction costs)
Public Health and Safety	<ul style="list-style-type: none"> <li>● Ensure proper maintenance and operation of Contractor's facility</li> <li>● Provide and implement an occupational health and safety plan</li> <li>● Appoint a trained occupational health and safety staff on-site</li> <li>● Provide workers with appropriate personal protective equipment (PPE)</li> <li>● Provide workers with adequate drinking water and breaks</li> <li>● Provide workers training on safety procedures and emergency response</li> <li>● Roads passing through population centers will be sprayed with water to reduce dust</li> <li>● Provide waste management plan</li> <li>● Cordon off trenches and working areas with a reflective tape to ensure safety of pedestrians and provide crossing areas for access</li> <li>● Provide clean and adequate toilets for women and men workers (following WHO standards)</li> <li>● Develop and implement grievance mechanism for affected women and men, girls and boys</li> <li>● Use a gender-responsive approach</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor	500 (SIBUTU) 500 (SITANGKAI)	(Included in development & construction costs)
Spread of communicable diseases	<ul style="list-style-type: none"> <li>● Sensitize workers and the surrounding communities on awareness, prevention, and management of communicable diseases;</li> <li>● Provide information, education, and communication on how the prevention and management of communication diseases</li> <li>● Use a gender-responsive approach</li> </ul>	<b>Supervision:</b> UNIDO or PMU, gender expert <b>Execution:</b> PMU, contractor	500 (SIBUTU) 500 (SITANGKAI)	(Included in development & construction costs)



	Occupational health and safety risks	<ul style="list-style-type: none"> <li>• Ensure clear human resources policy against any form of harassment aligned with the existing national law</li> <li>• Integrate provisions related to any form of harassments in the employee's code of conduct (COC)</li> <li>• Ensure compliance with all applicable labor laws of the country</li> <li>• Provide training and capacity building for all workers handling chemicals</li> <li>• Provide PPE to all workers especially those handling or using chemicals</li> <li>• Use a gender-responsive approach, e.g. build awareness of workers on the gender dimensions of the local population and the project</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor</p>	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Sexual exploitation and abuse (SEA) of community members by project workers	<ul style="list-style-type: none"> <li>• Develop and implement a SEA action plan with an Accountability and Response Framework as part of the ESMP. The SEA action plan shall follow available guidelines of the organization or of the country</li> <li>• The SEA action plan will include how the project will ensure that necessary steps are in place for the: (1) prevention of SEA; (2) response to SEA; (3) engagement with the community; ((4) management and coordination.</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor</p>	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Gender-based violence (GBV) at the community level	<ul style="list-style-type: none"> <li>• Implement provisions ensuring that gender-based violence at the community level is not triggered by the project, including: (1) effective and on-going community engagement; (2) review of specific project components that known to heighten GBV risk at the community level, e.g., compensation and employment schemes; and (3) specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment</li> <li>• Ensure adequate referrals mechanisms are in place if a case of GBV at the community level is reported related to the project implementation</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Violation of children's rights by contractor and labor force on site	<ul style="list-style-type: none"> <li>• Develop and implement a Children's Protection Strategy that will ensure minors are protected against negative impacts associated with the Project.</li> <li>• All staff of the project must sign and commit themselves to protect children, which clearly defines what is and is not acceptable behavior</li> <li>• Children under the age of 18 years should not be hired on site as provided by the applicable law in the country</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>
	Labor influx	<ul style="list-style-type: none"> <li>• Prepare the Labor Influx Management Plan as well as the Labor and Recruitment Plan</li> <li>• Institute a code of conduct for workers. This code of conduct must be signed and followed by all workers involved in the project</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor</p>	500 (SIBUTU) 500 (SITANGKAI)	<i>(Included in development &amp; construction costs)</i>

Gender mainstreaming and women's empowerment	<ul style="list-style-type: none"> <li>● Mainstream Gender Inclusivity in the hiring of workers</li> <li>● Ensure equitable distribution of employment opportunities</li> <li>● Ensure gender awareness of employed workers</li> <li>● Apply a gender-responsive approach to all project activities</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor</p>	500 (SIBUTU) 500 (SITANGKAI)	(Included in dev't & construction costs)
Service Delivery Impacts	<ul style="list-style-type: none"> <li>● Provide a traffic management plan which will provide alternative routes, traffic controllers, concrete barriers, and speed limits</li> <li>● Communicate any intended disruption of the services to the community</li> <li>● Cordon off trenches</li> <li>● Repair of any affected areas in consultation with local authorities</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	500 (SIBUTU) 500 (SITANGKAI)	(Included in development & construction costs)
Crime management	<ul style="list-style-type: none"> <li>● Develop and implement crime management plan</li> <li>● Fence off the Contractor's camp</li> <li>● Work with local committees in addition to the contractor's own security</li> <li>● Remove any employees who persists in any misconduct, carries out duties incompetently or negligently, fails to conform to any provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the community</li> <li>● Take all reasonable precautions to prevent unlawful, riotous, or disorderly conduct by or among the contractor's personnel</li> <li>● Prohibit alcohol, drugs, arms, and ammunitions on the worksite</li> <li>● Log all events of a criminal nature that occur at the worksite</li> <li>● Report all activities of a criminal nature on the worksite to the police</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	1,000 (SIBUTU) 1,000 (SITANGKAI)	(Included in development & construction costs)
Liability for loss of life, injury, or damage to property	<ul style="list-style-type: none"> <li>● Provide of PPE and train workers on the operation of the machinery and equipment</li> <li>● Adequate warning and directional signs</li> <li>● Ensure that the Code of Conduct for staff are followed to prevent accidents</li> <li>● Develop a site safety action plan</li> <li>● Cordon off unsafe areas and provide first aid kit within the construction site</li> <li>● Record all injuries that occur on-site in the incident register, corrective actions for their prevention will be instigated as appropriate</li> <li>● Repair any damage to properties in the area during implementation</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU, gender expert  <b>Execution:</b> PMU, contractor  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	1,000 (SIBUTU) 1,000 (SITANGKAI)	(Included in development & construction costs)

<b>O&amp;M Phase</b>	Generation of solid waste	<ul style="list-style-type: none"> <li>Implement the solid waste management masterplan</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU  <b>Execution:</b> PMU, Water Service Provider (Water District)  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	1,000 ( <b>SIBUTU</b> ) 1,000 ( <b>SITANGKAI</b> )	(Included in O&M costs)
	Nuisance and noise	<ul style="list-style-type: none"> <li>Desalination warehouse should be installed with acoustic packages or noise-reduction system following the available guidelines</li> </ul>	<p><b>Supervision:</b> UNIDO or PMU  <b>Execution:</b> PMU, Water Service Provider (Water District)  <b>Partner:</b> Host LGU (municipal and barangay levels)</p>	500 ( <b>SITANGKAI</b> )	(Included in O&M costs)

Table 7.6. Social Monitoring Program

Project Activity	Proposed Mitigation Measure	Parameters to be monitored	Location	Measurements (incl. methods & equipment)	Frequency of Measurement	Responsibilities (incl. Review and reporting)	Cost of equipment & individuals for each site (USD)
Pre-Construction Phase	Identify the owners and the type of structures affected by the project for compensation.	Number of compensated owners (gender-disaggregated)	Project Site: SIBUTU & SITANGKAI	(1) Records or receipt of compensation (2) Signed contracts	Prior to works commencing – as required	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	500 (Included in dev't & construction costs)
	Conduct valuation and compensate the loss of livelihoods during the project implementation	Number of compensated locals (gender-disaggregated)		Records or receipt of compensation			500 (Included in dev't & construction costs)
	Prepare a labor influx management plan	Labor Influx Management Plan		Labor influx management plan document			500 (Included in dev't & construction costs)
	Appoint a trained Occupational Health and Safety (OHS) staff on-site for the duration of the construction work	Appointment of OHS staff		Contract of employment			500 (Included in dev't & construction costs)
	Provide workers training on safety procedures and emergency response, and enhance their gender awareness	Number of trained workers (gender-disaggregated)		Training attendance sheets			500 (Included in dev't & construction costs)
	Plan new infrastructure at a suitable elevation above the current high tide level and designed to withstand extreme weather events	Plant design	Project Site: <b>SITANGKAI</b>	Surveys and design reports	During detailed design period	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	500 (Included in dev't & construction costs)

<b>Construction Phase</b>	Provide and implement a traffic management plan	(1) Number of identified alternative routes and (2) Number of traffic controller hired	<b>Project Site: SIBUTU &amp; SITANGKAI</b>	Traffic management plan and traffic records	Daily	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, Water Service Provider (Water District) <b>Partner:</b> Host LGU (municipal and barangay levels)	500 (Included in dev't & construction costs)
	Provide temporary road signs or notices to indicate ongoing works	Number of signs and notices put in place for the implementation		Physical inspection	Prior to works commencing		500 (Included in dev't & construction costs)
	Hire unskilled and skilled labor from the local population as possible	Number of local workers hired (gender-disaggregated)		Workers/staff records and signed contracts for works	Monthly	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	500 (Included in dev't & construction costs)
	Enforce and maintain a code of conduct (COC) for workers or employees	Number of violations to the COC (gender-disaggregated)		Records or documentation of the violations	Monthly		500 (Included in dev't & construction costs)
	Ensure proper maintenance and operation of Contractor's plant	Maintenance and operation manual		Maintenance and operation manual document and physical Inspection	Monthly		500 (Included in dev't & construction costs)
	Provide and implement an occupational health and safety (OHS) plan	(1) OHS Plan (2) Number of OHS-related incidents (gender-disaggregated)		(1) OHS Plan document (2) Physical inspection	Monthly		500 (Included in dev't & construction costs)
	Provide workers with appropriate personal protective equipment (PPE)	Number of PPE sets provided		(1) Inventory of PPE sets (2) Physical inspection	Daily		500 (Included in dev't & construction costs)
	Provide Emergency Response Policy Plan (ERPP), see chapter on Safety Measures	Frequency of Emergency Occurrence		(1) Inventory of Potential Hazards and (2) regular inspection of workplace and project sites	Daily; Weekly		500 (Included in dev't & construction costs)

	Roads passing through population centers will be sprayed with water to reduce dust	Frequency of spraying water		(1) Physical inspection (2) Documentations or records	Daily	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	500 (Included in dev't & construction costs)
	Provide waste management plan	Waste management plan	Project Site: <b>SIBUTU &amp; SITANGKAI</b>	(1) Physical inspection (2) Documentations or records	Monthly		500 (Included in dev't & construction costs)
	Cordon off trenches and working areas with a reflective tape to ensure safety	Number of incidents involving pedestrians' safety		Physical inspection and documentations or records of incidents	Monthly		500 (Included in dev't & construction costs)
	Provide clean toilets for women and men workers (following WHO standards)	Number of toilets provided (gender-disaggregated)		Physical inspection	Monthly		500 (Included in dev't & construction costs)
	Sensitize workers and the communities on awareness, prevention, and management of communicable diseases;	(1) Number of campaigns conducted		(1) Documentations (2) Attendance lists (3) Interviews with staff and local community	Monthly		500 (Included in dev't & construction costs)
	Ensure clear human resources policy against any form of harassment aligned with the existing national law	(1) Discrete reporting pathway (2) Number of trainings for staff		(1) Interviews with staff and management (2) Physical inspection (3) Training attendance	Monthly		500 (Included in dev't & construction costs)
	Integrate provisions related to any form of harassment in the employee's code of conduct	Number of complaints and violations		(1) Compliance in COC (2) Documentation of complaints/violations	Monthly		500 (Included in dev't & construction costs)
	Provide training and capacity building for all workers handling or using chemicals	Number of trainings provided (gender-disaggregated)		Attendance lists and interviews with workers	Prior to work commencing as required		500 (Included in dev't & construction costs)



	Develop and implement a Sexual Exploitation and Abuse (SEA) action plan with an Accountability and Response Framework as part of the ESMP	(1) Provisions in Code of Conduct (COC) about SEA (2) Number of staff trainings (gender-disaggregated) (3) Community Liaison Officers trained in SEA (gender-disaggregated) (4) Information and Education Campaign (IEC) materials (5) Discrete SEA reporting pathway	Project Site: <b>SIBUTU &amp; SITANGKAI</b>	(1) Interviews with workers, staff, and local community (2) Review monthly minutes from SEA coordination meetings	Monthly	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	1,000 (Included in dev't & construction costs)
	Implement provisions ensuring that gender-based violence (GBV) at the community level is not triggered by the project	(1) GBV Action Plan (2) Discrete GBV reporting pathway (3) Number of GBV cases (gender-disaggregated)		(1) Interviews with staff and local community (2) Training attendance (3) Consultation reports (4) GBV risk assessment	Monthly		500 (Included in dev't & construction costs)
	Develop and implement a Children's Protection Strategy	Number of reported cases involving abuse of children		Records of the reported cases and interviews with staff and local community	Monthly		500 (Included in dev't & construction costs)
	Mainstream Gender Inclusivity in the hiring of workers and ensure equitable distribution of employment opportunities	Number of women and men employed by the project		Company staff records	Monthly		500 (Included in dev't & construction costs)
	Develop and implement crime management plan	Number of reported crimes and complaints		Records and interviews with staff and local community	Monthly		500 (Included in dev't & construction costs)

	Train workers on the operation of the machinery and equipment	Number of trainings conducted (gender-disaggregated)	Project Site: <b>SIBUTU &amp; SITANGKAI</b>	Training attendance and interviews with workers	Prior to work commencing- as required	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, contractor	500 (Included in dev't & construction costs)
	Develop a site safety action plan	Site safety action plan		Site safety action plan documents	Prior to work commencing- as required		500 (Included in dev't & construction costs)
	Provide first aid kit and adequate warning and directional signs in the site	Availability of first aid and warning and directional signs		Physical inspection	Monthly		500 (Included in dev't & construction costs)
	Record all injuries that occur in the incident register, corrective actions will be instigated as appropriate	Number of accidents and damages done		Records and interviews with staff and local community	Monthly		500 (Included in dev't & construction costs)
	Repair any damage done to properties in the area during project implementation	Number of repairs done to properties during project implementation (women and men owned properties)		(1) Records of repair (2) Physical inspection (3) Interviews with staff and local community	Monthly		500 (Included in dev't & construction costs)
	Canvas for local suppliers of the needed construction materials and aggregates	Number of supplier's contracts		Contract for local materials suppliers	As required throughout the work period		500 (Included in dev't & construction costs)
	Provide information about the culture, tradition, and other social factors	Number of conflict incidence and/or complaints		(1) Agreed COC (2) Information brochure to community	Throughout construction		500 (Included in dev't & construction costs)
	Restrict the working hours to the standard working hours in the locality (8AM - 5PM)	Number of complaints from the community (gender-disaggregated)		(1) Workers time allocation records (2) Complaints register	Throughout construction		500 (Included in dev't & construction costs)

	Use of vehicles, plant, and equipment that comply with international standards for construction noise emission	Number of complaints from the community (gender-disaggregated)		Vehicle and plant maintenance records	Throughout construction		500 (Included in dev't & construction costs)
<b>Operation and Maintenance Phase</b>	Implement the solid waste management masterplan	Number of complaints from the local community (gender-disaggregated)		(1) Physical inspection and (2) Interviews with staff and local community	Monthly	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, WSP (Water District) <b>Partner:</b> Host LGU	1,000 (Included in O&M costs)
	Desalination warehouse should be installed with noise-reduction system following the available guidelines	Number of complaints from the local community (gender-disaggregated)	Project Site: <b>SITANGKAI</b>	(1) Interviews with staff and local community and (2) Records of public complaints	During operation		500 (Included in O&M costs)

*Table 7.7. Institutional strengthening and training activities for implementation*

#	Institutional Strengthening Activity	Position(s)	Scheduling	Responsibility (ies)	Cost Estimates (USD)
1	ESSPP	Project manager; EMSP Officers; technical staff; LGU beneficiaries	During project implementation	<b>Supervision:</b> UNIDO or PMU <b>Execution:</b> PMU, Contractor, WSP (Water District) <b>Partner:</b> Host LGU	1,000 ( <b>SIBUTU</b> ) 1,000 ( <b>SITANGKAI</b> )
2	ESMP				1,000 ( <b>SIBUTU</b> ) 1,000 ( <b>SITANGKAI</b> )
3	Gender Sensitivity; Code of Conduct; Labor Codes				500 ( <b>SIBUTU</b> ) 500 ( <b>SITANGKAI</b> )
4	Review of National Laws relating to Energy-and-Water Management systems				500 ( <b>SIBUTU</b> ) 500 ( <b>SITANGKAI</b> )
5	Updating of LGU Comprehensive Development Plan and Climate Change Action Plan				500 ( <b>SIBUTU</b> ) 500 ( <b>SITANGKAI</b> )
6	Review of Mandanas-Garcia Ruling and its impacts on the role of LGU in project development				500 ( <b>SIBUTU</b> ) 500 ( <b>SITANGKAI</b> )

**Table 7.8. Proposed Training Activities**

#	Training Activity	Participants	Types of Training	Contents (modules, etc)	Scheduling	Cost Estimates (USD)
1	Gender Sensitivity; Code of Conduct; Labor Codes	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	Workshop and Training Modules covering Gender Sensitivity; Code of Conduct, Labor Codes	During project implementation	500 ( <b>SIBUTU</b> ) 500 ( <b>SITANGKAI</b> )
2	Financial Literacy (under consideration of gender dimensions)	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	Modules covering Personal Financial Management	During project implementation	1,000 ( <b>SIBUTU</b> ) 1,000 ( <b>SITANGKAI</b> )
3	Water Conservation and Management (under consideration of gender dimensions)	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	Modules covering Water Conservation and Management		2,000 ( <b>SIBUTU</b> ) 2,000 ( <b>SITANGKAI</b> )
4	Design additional training programs based on a gender-responsive Training Needs Analysis (TNA) of communities	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	To be determined		5,000 ( <b>SIBUTU</b> ) 5,000 ( <b>SITANGKAI</b> )
5	Design gender-responsive training programs based on Training Needs Analysis of workers in the Desalination and Solar PV Power Facilities	Project manager; EMSP Officers; technical staff; Water Service Provider (WSP) management	Combination of lecture series and workshops; output oriented, case study reviews	To be determined		5,000 ( <b>SITANGKAI</b> )
6	Electrical Safety (including safety handling of machineries); OHS	Project manager; EMSP Officers; technical staff; LGU beneficiaries	Combination of lecture series and workshops; output oriented, case study reviews	Modules covering OHS, electrical safety, and proper use and handling of machineries		1,000 ( <b>SIBUTU</b> )



## 8 COORDINATION AND PUBLIC/NGO PARTICIPATION

### 8.1 Introduction

The primary purpose of conducting the stakeholder consultation was to encourage the participation of important stakeholders and local people in the process of the project implementation and to integrate the appropriate environmental and social concerns into the process, to ensure that whatever negative impacts the project may cause, these will be identified and mitigated early on, especially as regards to environmental and social safeguards. Moreover, the Philippine law specifies that the stakeholder consultation process shall be an integral part of the environmental and social impact assessment, thus, making it mandatory.<sup>12</sup> This report presents the stakeholder consultation process carried out for the proposed project in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines.

Initial meetings, key informant interviews (KIIs), focus group discussions (FGDs), EIA-SEP Household surveys (details are covered in **Annex F**), and consultations were held with the island communities and other stakeholders vis-a-vis local government officials, concerned regional government agencies officials, and influential community people (e.g., tribal leaders). During these meetings, the project objectives were explained and elaborated. The stakeholders' concerns and suggestions were also documented and taken care of to further enhance the project's acceptability on environmental and social grounds. During the field visits, a series of consultations were carried out at various locations in the project areas, wherever convenient and comfortable with the stakeholders. Please refer to Annex F for more details.

### 8.2 Key findings during the consultation meetings with stakeholders

The following tables below (Tables 8.1-8.2) are the summaries of all discussion meetings and the suggested action points.

**Table 8.1. Summary of the discussion and action points of the meeting facilitated by MinDA**

Discussion Points/Questions	Action Points/Remarks
<p>The acquisition of the information and data needed by the project such as:</p> <ul style="list-style-type: none"> <li>• Data on climate hazards and future climate trends in the proposed project sites (Sitangkai and Sitangkai) which can be taken from its respective climate and disaster risk assessments (CDRA), and from their local climate change action plan (LCCAP);</li> <li>• the baseline or historical data on the loss and damage incurred by the identified areas especially those attributed to climate change, particularly on the seaweed industry; and</li> <li>• Data on how the seaweed industry contributes to the economy (local, regional, or national).</li> </ul>	<p>MinDA will facilitate the gathering of the data as it is working closely with concerned agencies in the BARMM region.</p>
<p>A more comprehensive local benchmarking on the existing small-scale desalination plants in the country, especially in the BARMM region.</p>	<p>MinDA will also facilitate the gathering of information for this concern especially in the BARMM region.</p>
<p>Possible synergies of the proposed project with the other projects in Mindanao area (jurisdiction of MinDA) and other agencies of BARMM.</p>	<p>MinDA expressed that synergies with other projects in the area are possible and that they can facilitate the flow of more information accordingly.</p>
<p>Business models for the proposed integrated water management system (water district) for both sites in Sitangkai and Sitangkai Islands.</p>	<p>Based on the consultation meetings with the community in both sites, the lead consultant recommended that a joint venture between the public sector (the LGU in this case) and the private sector will be facilitated for the water management system.</p>

<sup>12</sup> According to the updated guidelines stated in the Environmental Management Bureau Memorandum Circular No. 2014-005 (EMB MC 2014-005) or the Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS (Presidential Decree 1586 of 1978, otherwise known as the Philippine Environmental Impact Statement System).



Discussion Points/Questions	Action Points/Remarks
	In the said JV, the LGU will carry out their oversight function as they clearly expressed that they do not have the expertise to do the operation and maintenance of the water management system. The private sector will take charge of the whole operation and maintenance of the facility, by hiring suitable professionals and skilled workers to carry out the required tasks for the sustainability of the water system.
Communal sanitation facility	The project scope afforded the establishment of demonstration facilities or pilots in both sites. It was also discussed that a communal sanitation facility can be built for those in the fishing villages or “pondohan” but it will be beyond the scope of the project.
Communal rainwater harvesting facility	The project scope afforded the establishment of demonstration facilities or pilots in both sites.
Studies on “willingness to pay” for water in both project sites	The lead ESIA consultant discussed that the community expressed their willingness to pay for the water and its corresponding water services as they recognized the need to sustain the system for the water supply and distribution.
Salt-making from the brine discharge of the desalination as a mid- to long-term mitigation plan.	It was recommended that thorough studies be conducted to ascertain the feasibility of making salt (industrial or food-grade application) from the brine discharge of the desalination facility.  The budgetary requirement for the feasibility studies and the establishment of the (pilot) salt-making facility in the area will be provided by the lead ESIA consultant, for further evaluation by the project team for its inclusion in the proposed project budget.
Knowledge-sharing activities on the process documentation of developing a water system project (e.g. desalination facility) was suggested by MinDA to be included as one of the activities under Project Component 1.	This suggestion was duly noted and will be added accordingly.

**Table 8.2** presents the discussion summary of issues and concerns expressed by the barangay officials regarding their water supply and water distribution system, sanitation situation, and solid waste management.

**Table 8.2. Summary of the issues and concerns during the consultation and its suggested solutions**

Issues and Concerns	Suggested Solutions
<b>SIBUTU ISLAND</b>	
<b>Water Sources</b> - Most of the barangays in Sibutu have groundwater sources. However, some barangays, especially in the western part of Sibutu, have no groundwater sources as expressed by their barangay officials.	Sharing of water sources for some barangays will be explored through the design of the water distribution network of the project. Since rainwater is the major source of water in many households on the island, the idea of developing a communal rainwater harvesting system as one of the solutions for this issue is positively perceived by the barangay officials.
<b>Water Quality</b> - Admittedly, the BLGU, and MLGU disclosed that there is no water quality testing conducted on the existing groundwater sources on the island. The only water quality	Water quality testing of the identified groundwater sources on the island will be conducted accordingly to ascertain whether its safety and standards for drinking water. A water

<p>testing conducted for some water sources on the island was conducted by the team of the RETS Project. However, only the identified groundwater sources in the eastern part of the island have been tested in 2021.</p>	<p>disinfection system is highly welcomed as an additional treatment feature of the water system to be included in the project.</p>
<p><b>Water Distribution System</b> - Several barangays in Sibutu already have a water supply and distribution system infrastructure (concrete water tanks, pipelines, etc.) with Level II service but most of such systems are not operational due to the difficulty in doing maintenance works, especially on its motorized components coupled with their financial constraints.</p>	<p>Detailed assessment of the status and the rehabilitation needs of the existing water system infrastructure in several barangays in Sibutu will be conducted prior to the project implementation to ascertain the budgetary requirements for its rehabilitation and the water quality and quantity.</p>
<p><b>Sustainability and management of the water supply system</b> - With the experience of some barangay officials on failed projects involving water supply and distribution, they all expressed their concern about how to sustain the water supply and distribution system in their respective areas.</p>	<p>The project will establish an integrated water management system (IWRM) to promote the sustainability of the operation of the waterworks system on the island thru the organization of a water service provider (water district), who is tasked to manage the water supply system.</p>
<p><b>Role of the BLGU and MLGU in the project</b> - The BLGU and MLGU asked about their roles in the project implementation and project operation during the consultation meetings, especially with the plan to establish an integrated water management system (IWRM thru a WSP) in the island.</p>	<p>A joint venture (JV) between the LGU and the private sector was suggested during the discussion about the integrated water management system. All the officials expressed their openness to this arrangement and recognized it as one way of promoting the sustainability of the system. The oversight function of the LGU was highlighted in the discussion.</p>
<p><b>Cost of water service</b> - After the discussion about the integrated water management system, questions about the cost of the water service then followed as this was also one of the major considerations of the households on the island as expressed by its barangay officials. They also recognized the need for payment to really sustain the water supply system. They also added that they are all willing to pay for the water service if it is reasonable.</p>	<p>With the JV arrangement and the oversight function of the LGU in the management of the water supply system, the price for the water services is assured to be reasonable and affordable as compared to the current costs of water procurement paid by most households in Sibutu.</p>
<p><b>Household water connection</b> - A question about how the household can avail or connect to the proposed water supply system was also aired during the consultation. It was also clarified whether a water meter will be used since water billing will be implemented.</p>	<p>It was clarified in the discussion that household connections will be arranged and paid for by the household and not by the project just like how the household connects to TAWELCO for their electricity. Water meters will also be installed. However, the project thru the WSP can facilitate the installation of Level III water distribution system.</p>
<p><b>Sanitation</b> - Most of the barangay officials and even the municipal officials during the consultation meetings admitted that sanitation is a major concern in the island. They elaborated on the difficulty of their sanitation situation given the fact that there are many households built on stilts on the island. There are barangays that built a public toilet for the community but are not sustained because also of their water scarcity situation.</p>	<p>The idea of a communal sanitary toilet and septic tanks was introduced during the discussion with the barangay officials. It was received positively by them and affirmed that the said solution is feasible if it is designed properly and that there is sufficient water to maintain its cleanliness.</p>
<p><b>Solid Waste Management</b> - When it comes to solid waste management, the same sentiments regarding their sanitation situation were expressed by the barangay officials. They attempted to put up a landfill in the innermost part of the island, however, there was a problem with the collection of garbage. The barangays have no available garbage trucks to collect the solid waste and dump it in their designated landfill area. The current practice now is to throw the garbage to the sea and or construct a makeshift open pit to partly bury it.</p>	<p>Ideally, a sanitary landfill is not recommended in an island community like Sibutu. Several solutions could be implemented on the island like a modular waste-to-energy system that requires considerable budget allocation. However, initial works can be done on the island like the establishment of a material recovery facility (MRF) and the implementation of the Solid Waste Management System employing the Circular Economy principles (e.g., 6Rs).</p>

<p><b>Public Consultation</b> - A question about a public consultation for the project was also raised in the consultation with the barangay officials.</p>	<p>The barangay officials are assured that another round of public consultations will also be conducted in the succeeding stages of project preparation and implementation.</p>
<p><b>SITANGKAI ISLAND</b></p>	
<p><b>Water Sources</b> - The identify and existing ground wells or dug wells in Sitangkai produced water that is not suitable for human consumption since it is brackish and salty.</p>	<p>The project will install a desalination facility on the island using reverse osmosis (RO) technology. It is expected to produce enough supply of fresh potable water for Sitangkai. Since rainwater is the major source of water in many households on the island, the idea of developing a communal rainwater harvesting system as one of the solutions for this issue is positively perceived by the barangay officials.</p>
<p><b>Water Sources</b> - A question on where to source the water that will undergo the reverse osmosis process in the desalination facility was raised. It was then followed with a clarification if there will be permits needed for this was also expressed during the discussion.</p>	<p>A beach well (dug well) will be dug up to source the water that will undergo the RO process in the desalination facility. It was also clarified and emphasized that environmental compliance will be processed accordingly.</p>
<p><b>Water Quality</b> - Admittingly, water quality testing was conducted for the existing water sources on the island through the RETS Project. The results show that it is not suitable for human consumption because of its high level of salinity.</p> <p>They also expressed their concern regarding the water quality of the water produced from the desalination facility once it is operational.</p>	<p>Once operational, cyclic water quality testing and monitoring of the water produced by the desalination facility will be conducted. Clearances and permits will also be processed before the water from the desalination facility are distributed to the community.</p>
<p><b>Water Distribution System</b> - Some barangays in Sitangkai have already some water system infrastructure (concrete water tanks, pipeline, etc.) and a water distribution network with Level II service but the majority of such systems are not operational due to the difficulty in doing maintenance works, coupled with their financial constraints.</p>	<p>Detailed assessment of the status and the rehabilitation needs of the existing water system infrastructure in several barangays in Sitangkai will be conducted prior to the project implementation.</p>
<p><b>Sustainability and management of the waterworks system</b> - With the experience of some barangay officials on failed projects involving water projects, they all expressed their concern about how sustainability of the facility.</p>	<p>The project will establish an integrated water management system to promote the sustainability of the operation of the desalination facility and the waterworks system on the island.</p>
<p><b>Impacts on the marine ecosystem</b> - There was also a question raised regarding the impact of brine disposal from the desalination facility on the marine ecosystem in the area especially since most of the households are seaweed farmers.</p>	<p>It was clearly explained that brine disposal impact is considered unlikely to affect the marine ecosystem as the dilution of the brine effluent is expected over a short distance from the point of discharge.</p> <p>A monitoring regime that will track changes in the salinity level over and adjacent to the point of discharge will be put in place.</p> <p>Risks of damage to vegetation and salinity level of ground from leaks in the brine disposal system and failure of the desalination plant will remain but will be mitigated by improving the management and implementation of improved maintenance of the facility afforded by the capacity building and maintenance support of the project.</p>
<p><b>Added value of the project</b> - There was also a question raised on the possibility of the use of brine effluent in making salt.</p>	<p>It was explained that this was outside the scope of the project but a recommendation to make prior studies for the said suggestion should be conducted.</p>

<p><b>Role of the BLGU and MLGU in the project</b> - The BLGU and MLGU asked about their role in the project implementation and project operation during the consultation meeting, especially with the plan to establish an integrated water management system on the island.</p>	<p>The support and participation of the LGU in the project are key factors in its successful implementation and operation. This was emphasized during the discussion.</p> <p>A joint venture (JV) between the LGU and the private sector was suggested during the discussion about the integrated water management system (water districts). All the officials expressed their openness to this arrangement and recognized it as one way of promoting the sustainability of the system. The oversight function of the LGU was highlighted during the said discussion.</p>
<p><b>Cost of water service</b> - After the discussion about the integrated water management system, questions about the cost of the water and its corresponding water service then followed as this was also one of the major considerations of the households on the island as expressed by its barangay officials. They also recognized the need for payment to really sustain the waterworks system in their municipality. They also added that they are all willing to pay for the water service as long as it is reasonable.</p>	<p>With the JV arrangement and the oversight function of the LGU in the management of the waterworks system, the price for the water and for the water services are assured to be reasonable and affordable as compared to the current cost of water procurement for most households on the island.</p>
<p><b>Disruption in the water distribution businesses</b> - A question was raised about the impact of the operation of the desalination facility on the existing businesses that involved water distribution.</p>	<p>The project emphasized that it does not intend to compete with the existing water distribution businesses. The project encourages synergy as it is geared to address the community water needs - for the greater good.</p>
<p><b>Sanitation</b> - The majority of the barangay officials and even the municipal officials during the consultation meetings admitted that sanitation is a major concern in the island. They elaborated on the difficulty of their sanitation situation given the fact that there are many households built on stilts on the island. There are barangays that built a public toilet for the community but are not sustained because also of their water scarcity situation.</p>	<p>The idea of a communal sanitary toilet and septic tanks was introduced during the discussion with the barangay officials. It was received positively by them and affirmed that the said solution is feasible as long as it is designed properly and that there is sufficient water to maintain its cleanliness.</p>
<p><b>Sanitation</b> - There was also a question on whether the said communal sanitation facility can be built for those fishing villages in the middle of the sea or commonly known as “pondohan.”</p>	<p>Those fishing villages or “pondohan” will benefit from the expansion of the project. It was mentioned during the discussion that the scope of the project can only build a demonstration facility for the said communal sanitation facility.</p>
<p><b>Solid Waste Management</b> - When it comes to solid waste management, the same sentiments regarding their sanitation situation were expressed by the barangay officials. They attempted to put up a landfill for their solid waste in the innermost part of the island, however, there was a problem with the collection of garbage. The barangays have no available garbage trucks to collect the solid waste and dump it in their designated landfill area. The current practice now is to throw the garbage to the sea and or construct a makeshift open pit to partly bury it.</p>	<p>Ideally, a sanitary landfill is not recommended in an island community like Sitangkai. Several solutions could be implemented on the island like a modular waste-to-energy system that requires considerable budget allocation. However, initial works can be done on the island like the establishment of a material recovery facility (MRF) and the implementation of the Solid Waste Management System employing the Circular Economy principles (e.g., 6Rs).</p>
<p><b>Public Consultation</b> - A question about a public consultation for the project was also raised in the consultation with the barangay officials.</p>	<p>The barangay officials are assured that another round of public consultations will also be conducted in the succeeding stages of project preparation and implementation.</p>

Generally, the officials of the 9 barangays in Sitangkai and 16 barangays in Sibutu appreciated the value of the proposed project for their community as they clearly perceived the benefits of having an improved water supply and distribution system in their respective municipalities. Furthermore, in Sitangkai, the municipality represented by the President of the Liga ng mga Barangays, who is a de

facto member of the municipal council, and the Indigenous People’s President, who also has a seat in the council, also expressed their appreciation and positive opinion regarding the proposed project in Sitangkai island and vowed to extend their full support of the project implementation. Actually, both municipalities of Sibutu and Sitangkai vowed to champion the project in their municipal councils especially in the upcoming project implementation.

### 8.3 Project Disclosure

Relevant guidelines of UNIDO ESSPP prescribe that the affected population and institutions should be fully informed by disclosing the information relevant to the project impacts, the mitigation measures, and the project’s key processes. Consultation with them is, therefore, the starting point for all the project-related activities to allay misgivings, misunderstanding, miscommunications, and apprehensions about the project. It is also undertaken to solicit the project’s acceptability and ensure the participation of the community in the project planning and implementation. It is also providing the community with the opportunity to participate in key decisions of the project that are likely to affect them. To note, during the EIA-SEP household surveys, it was further expressed by the respondents that continued public consultations about the project be done during implementation.

**Table 8.3** below is presented to outline the Communication Plan which serves as guide in disclosing project progress to all internal and external stakeholders and partners.

**Table 8.3. Communication Plan in reporting progress and updates during project implementation**

Stakeholder Groups	Objectives & Key Messages	Communication Type	Communication/Delivery Methods; Frequency	Feedback Mechanisms
UNIDO, Project Steering/Advisory Group, PMU, partner agencies, other stakeholders	Project goals & objectives, strategic planning, management & implementation, monitoring & evaluation (M&E), finance, oversight, etc.	Mandatory, Consultative, Participative, Informational	Online or face-to-face meetings, quarterly or semi-annual meetings	Reporting, discussion/feedback, email/phone correspondence, Grievance Management Mechanisms (GMM), others
UNIDO, PMU, contractors, other stakeholders	Management, implementation, M&E, finance, budgeting, other related concerns	Mandatory, Consultative, Participative, Informational	Online or face-to-face meetings, weekly/monthly meetings, as needed	Reporting, discussion/feedback, email/phone correspondence, GMM, others
PMU, Local government unit representatives, other agencies	Relevant project progress/updates, project-related concerns and issues, e.g., environmental and social impact, contractor-related issues, land use issues, etc.	Mandatory/ Voluntary, Consultative, Participative, Informational	Online or face-to-face meetings as needed; informational-educational campaigns (IEC), workshops, trainings, others	Reporting, discussion feedback, email/phone correspondence, workshops, trainings, GMM, others
PMU, target beneficiaries, local communities, other external stakeholders	Relevant project progress/updates, project-related concerns and issues, other matters that need attention, e.g., socio-cultural issues	Mandatory/ Voluntary, Consultative, Participative, Informational	Online or face-to-face meetings arranged as needed, informational-educational campaigns, workshops, trainings, etc.	Reporting, discussion feedback, workshops, trainings, GMM, others

## 9 SAFETY MEASURES DURING OPERATION

### 9.1 National Laws and Regulations

As enumerated in **Section 2.1**, the national laws and regulations covering the scope of developing and rehabilitating the potable water supply and distribution system facility and that of the sanitation system of Sitangkai Island, Tawi-Tawi, Philippines, are applicable guidelines in exercising safety measures during the operation phase and the transferring of ownership of the project to the WSP (or water district).

In addition, other relevant laws and regulations are also included in the enumeration (Section 2.1). Of relevance and interest, is the **Presidential Decree (PD) 442 of 1974, which covers the Labor Code of the Philippines**, as amended and renumbered pursuant to DOLE Department Advisory No.1, series of 2015.<sup>13</sup> This law and its accompanying Implementing Rules and Regulations (IRR) serve as guide in managing safety measures during the operation phase of the project.

<sup>13</sup> The Labor Code of the Philippines Renumbered, DOLE Edition, 2022.

Specifically, the Labor Code of the Philippines, presents the details on **health, safety, and social welfare benefits in Book IV**, which include amongst others, **occupational health and safety of workers**.<sup>14</sup>

### 9.2 Environmental and Social Management Plan (ESMP)

The ESMP has been prepared for review, updating, implementation, and monitoring during the project period and beyond, that is, during the pre-construction, construction, and post-construction phases, the last phase may continue beyond the project term of four (4) years. It is understood that all the safety measures indicated and required in all the plans embedded in the ESMP must be properly observed, implemented, and monitored to mitigate any and all adverse impacts that may occur in the project. From the safeguards point of view, this must be an indispensable activity to be strictly followed by all members and collaborators of the project implementation team.

### 9.2 Emergency Response Policy Plan (ERPP)

The project implementer (PMU) together with the Contractor and in coordination with the host LGU will formulate an Emergency Response Policy Plan and corresponding protocols to address the safety concerns of the project during the construction and operation phases. It is in the interest of everyone to ensure that project implementation is hazard-free as possible and the factors leading to an accident are minimized if not eliminated. To attain this, the project implementer and its collaborators will formulate and implement protocols to address the following potential unwanted events during the construction and operational phases:

- a) Accidents at the workplace
- b) Severe weather conditions
- c) General emergency preparedness and response plan
- d) Disaster risk management plan
- e) Other mitigating and monitoring plans during facility operations, as required by law

In general, contingency and emergency planning are necessary to address accidents during the project implementation. The main components of contingency planning include (a) measures to prevent accidents, (b) methods for response and clean up, and (c) organizing and training of personnel to implement the plan. Among the measures to be instituted are a) medical assistance during accidents, b) communications, c) emergency response team, and d) address fire hazards by complying with the Fire Code of the Philippines.

Project implementation in the light of the COVID-19 pandemic should follow IATF, DOH, and LGU guidelines during the construction and operation phases. Sources of information for the pandemic protocols are the IATF Omnibus Guidelines on the Implementation of Community Quarantine in the Philippines with Amendments to date and the DOH Administrative Orders issued to date which prescribe the minimum Public Health Standards for COVID-19 Mitigation Risk. Minimum public health standards include physical distancing, masks, hand washing or sanitizing

### 9.3 Grievance Management Mechanism (GMM)

During the project implementation and beyond, a **grievance management mechanism** (GMM) needs to be established, updated, and regularly reviewed for any matters related to project design, construction and most especially during operation.<sup>15</sup> The local community and the public at large may perceive certain risks and hazards to themselves or their property or have concerns about the environmental performance and socio-economic impact of the project. From the environmental and social safeguards perspective, these issues may relate to construction and operation and therefore anybody will have rights to file complaints or protests or express concerns against any member of the project implementation team, including its collaborators, contractors, and workers, to address promptly and sensitively, all these complaints made (whenever there are any) without retribution.

During construction, the contractor will be required to comply with the project ESMP (combined Environmental and Social Management Plan), including any issues relating to noise, dust nuisance, accidental damage to property/utilities and exhaust emissions. The contractor will appoint one staff

---

<sup>14</sup> Ibid, page 56.

<sup>15</sup> Please refer to UNIDO's and AF's grievance mechanisms here:

- <https://www.unido.org/overview-report-wrongdoing/how-report-wrongdoing-or-adverse-environmental-and-social-impacts>

- <https://www.adaptation-fund.org/projects-programmes/accountability-complaints/ad-hoc-complaint-handling-mechanism-achm/>



member as a liaison officer for each worksite to receive complaints and initiate corrective action as appropriate. This person will be made available to the Supervising Engineer and the PMU. Further, the person's name and his/her contact details will be made available for each site and will be presented on appropriate notice boards at the project sites and at the PMU. The notice boards will also indicate the following:

- (i) that the public with a grievance or concern have the right to register complaints (verbally or in written form) and for the appropriate and reasonable action to be taken as soon as possible to address any valid complaint;
- (ii) that complaints can be made to the person concerned either verbally, in person, or in written form and
- (iii) that a written response will be provided within the next 48-72 hours, depending on the nature of the grievance.

The contractor will maintain a logbook on reports of complaints or expressions of concerns on site, which may contain the complaint forms that are filled out in duplicate, with one copy provided to the complainant. The forms will record date, time and nature of the complaint and information on the rights of the complainant and the processes to be followed for assessing and acting on the complaint. The forms will allow space for anonymous complaints to be registered. Registering and resolving a complaint will be at no cost to the complainant.

The contractor will then address the complaint and take corrective action agreed to with the complainant. For minor complaints, such as noise or dust nuisance, or disregard of safety procedures, immediate corrective action will be taken. For more serious issues requiring guidance or further discussions, the contractor will raise the issue with the Supervising Engineer and the PMU. A written response will be prepared, stating either:

- (i) the nature and duration of action that has been taken,
- (ii) where an issue is not readily addressed by direct action on site, the steps that have been taken for resolution, or
- (iii) complaint is considered invalid, with an explanation as to the reasons or justifications.

In each case, the complainant will be informed as to their rights for the next step. The response will be handed to the complainant or made available for them to collect, within 48-72 hours of the complaint being received.

Should the complainant remain dissatisfied with the action taken or the explanation received, the matter/complaint file will be forwarded to the Supervising Engineer and the PMU, or the host LGU, whenever applicable. The Supervising Engineer will have assigned a member of staff with the role of community liaison. The name of this individual will be provided on the complaints registration form, with contact details and notice that this individual can be approached for follow up in respect of the complaint and that this may be done in person, by phone or in written form.

The Supervising Engineer will consult with PMU or the host LGU (as applicable) and on their behalf review the complaint and the response of the contractor, then make a decision to be referred to the complainant within a maximum of two weeks. If the complainant remains dissatisfied with the Supervising Engineer's decision, the grievance may be filed with the host LGU (barangay level, then municipal level), which under normal conditions already follows the regular government process of resolving conflicts and grievances. The host LGU's ruling will be binding on all parties.

On matters regarding completion of the contractor's works, and when the contractor's defects liability is under scrutiny, the complaints are handed over to the PMU. The PMU, together with the Project Steering Committee, is responsible for receiving and acting on complaints relating to the construction, operation and maintenance of the water infrastructure facilities, sanitation pilots, and solar PV system. A complaints register (logbook) will be maintained. These processes may be done during the project period and will be institutionalized by the water service provider (e.g., water district), who will assume the responsibilities of managing operations and maintenance of all the water supply infrastructures established by the project. All the logbooks (complaints register) during the various phases of the project implementation will be subject to inspections during audits and monitoring.

## 10 CONCLUSIONS

The complex and incessant water issues faced by off-grid small island communities such as Sibutu and Sitangkai Islands located in the province of Tawi-Tawi, can be pivotal in the coming days due to the already-felt impact of climate change, where such island communities are at risk and very vulnerable to seawater level rise, unpredictable rainfall and drought patterns, and the pervasive

malpractices in sanitation and waste management. The proposed development and rehabilitation of potable water supply (e.g., with filtration and disinfection units, and a 1,000 CMD desalination facility powered by a 1.0 MWp solar PV power system), rehabilitation of the potable water distribution system, improvement of rainwater harvesting and sanitation systems in both islands are very urgent as it reflects the complexity of the water problem in these vulnerable areas and how the local communities are in dire need of such basic necessity for survival.

The proposed project makes use of a combination of approaches and strategies to provide potable and sustainably supplied safe water, reduce water leakages and wastage, improve rainwater harvesting systems and the sanitation facilities, coupled with institutional strengthening and behavioral change programs. These are deemed effective in addressing this urgent need and the project foresees significant environmental and health benefits that more than outweigh any adverse environmental impacts that may be incurred during construction and operation.

The project will build a new 1,000 CMD desalination facility powered by a 1.0 MWp solar PV power system in Sitangkai Island and rehabilitate the water supply systems in Sibutu Island, rehabilitate existing water and electrical infrastructure, and implement a WASH program. It is anticipated that the project will provide significant public health benefits such as consistent service of and access to potable public water and reduced public health risks from contamination. This will in turn result in the dramatic reduction of waterborne diseases, where acute watery diarrhea is the top one disease-causing morbidity in the province, thereby, reducing the burden on the health system. ***The primary beneficiaries are communities in both Sibutu and Sitangkai Islands, particularly women and children, who are culturally tasked to take care of these household chores of ensuring availability of safe and clean water.*** The project will also have socio-economic benefits such as from the generation of new jobs, vocational training opportunities, and improvement of the economic situation through reduced absenteeism in the workforce due to poor health. Environmental benefits associated with the project include water conservation and the use of renewable energy which will reduce the use of fossil fuels. Additional benefits include, improved planning, management, and sustainability of future water supply, improved development planning, and increased tourism potential. The project will also increase the resiliency of the water infrastructure to the impacts of climate change and natural hazards.

The natural habitat of both islands, which is a major haven for seaweed farming, has already been highly modified by the harsher environmental impacts and the densely populated communities. Identified environmental risks and impacts of the project include the short-term impacts from noise and nuisance, solid waste, dust, and disruption during construction. The impacts from the operation of water supply infrastructure include the impacts on marine water quality and ecosystem from the effluent brine solution of the desalination system in Sitangkai Island, and the direct sewage/septage disposal, which is worsening already as it is. Further risks caused by the project include the risk of the new infrastructure failing and the impacts of sludge disposal from the proposed sanitation units. Identified social impacts include the impacts of resettlement, although non-existent to minimal given the scope of the project, land access and encroachment onto private property. All risks were assessed to be very-low, low, or medium significance provided that the mitigations outlined in this ESIA are implemented. The exceptions are the significance of the risks to the quality of the groundwater reserves in Sibutu Island from over-extraction of water in the long run which remains high. The proposed WASH and water conservation campaigns are being implemented to address those risks.

The project's key environmental and social management and mitigation measures include the development, implementation, and monitoring of an ESMP (which is a combination of the EMP and SMP, in this case). The ESMP addresses the impacts and risks associated with construction and operation of the water supply infrastructure facility which includes treatment by desalination, filtration and disinfection (for existing water wells and collected rainwater), and water supply distribution, solar PV system to run the system, and sanitation infrastructure, and will be updated, further developed, and implemented as a working ESMP by the project implementing unit and the contractors. To mitigate the social impacts, the project will be located on government land whenever possible. A Resettlement Plan (RP), where needed, is to be prepared to address potential impacts on land and/or assets due to encroachments of water treatment, supply, distribution networks, water storage/booster pumps and the installation of the solar PV or solar-powered pumps and gadgets. This outlines the proposed consultation and compensation of affected households or communities. Where possible, public- or government-owned lands has been identified where the project infrastructures can sit.

To conclude, the ESIA has found that **no major** short-term or cumulative environmental and or social impacts are likely to occur from the project, provided that the ESMP is reviewed, updated, implemented, and monitored properly. Wherever needed, the resettlement plan (RP) is prepared, consulted, and implemented. The overall environmental, health and socio-economic benefits of the project definitely outweigh the perceived adverse environmental and social impacts that may occur.

## REFERENCES

- [1] United Nations, "Summary Progress Update 2021: SDG 6- Water and sanitation for all," UN Water, 2021.
- [2] A. Koutroulis and et.al., "Cross sectoral impacts on water availability at +2°C and +3°C for east Mediterranean island states: The case of Crete," *Journal of Hydrology*, vol. 532, pp. 16-28, 2016.
- [3] J. Daw and S. Stout, *Building island resilience through the energy, water, food nexus*, National Renewable Energy Laboratory, 2019.
- [4] J. M. Aberilla, A. Gallego-Schmid, L. Stamford and A. Azapagic, "Environmental assessment of domestic water supply options for remote communities," *Water Research*, vol. 175, 2020.
- [5] C. Papapostolou, E. Kondili, D. Zafirakis and G. Tzanes, "Sustainable water supply systems for the islands: The integration with the energy problem," *Renewable Energy*, vol. 146, pp. 2577-2588, 2020.
- [6] Sustainable Water and Energy Solution Network, *Sustainable Water and Energy Solutions: Addressing Critical Services during the COVID-19 World Crisis and Beyond*, Global Knowledge Platform, 2020.
- [7] L. Lozano and E. Taboada, "The power of electricity: how effective is it in promoting sustainable development in rural off-grid islands in the Philippines?," *Energies*, vol. 16(9), no. 2705, 2021.
- [8] L. Lozano, E. Querikiol, M. L. Abundo and L. Bellotindos, "Techno-economic analysis of a cost-effective power generation system for off-grid island communities: A case study of Gilutongan Island, Cordova, Cebu, Philippines," *Renewable Energy*, vol. 140, no. 9513, pp. 905-911, 2019.
- [9] Querikiol, E.M. and Taboada E.B., "Performance Evaluation of a Micro Off-Grid Solar Energy Generator for Islandic Agricultural Farm Operations using HOMER," *Renewable Energy*, 2018.
- [10] L. Lozano and E. B. Taboada, "Demystifying the authentic attributes of electricity-poor populations: The electrification landscape of rural off-grid island communities in the Philippines," *Energy Policy*, vol. 145, no. 111715, 2020.
- [11] L. Lozano and E. B. Taboada, "Elucidating the challenges and risks of rural island electrification from the end-user's perspective A case study in the Philippines," *Energy Policy*, vol. 150, no. 112143, 2020.
- [12] L. Lozano and E. B. Taboada, "Applying User-Perceived Value to Determine Motivators of Electricity Use in a Solar Photovoltaic Implementation in a Philippine Island," *Sustainability*, vol. 13, no. 8043, 2021.
- [13] I. Rabuya, M. Libres, M. Abundo and E. B. Taboada, "Moving Up the Electrification Ladder in Off-Grid Settlements with Rooftop Solar Microgrids," *Energies*, vol. 14, no. 3467, 2021.
- [14] F. Giudici, A. Castelletti, E. Garofalo, M. Giuliani and H. R. Maier, "Dynamic, multi-objective optimal design and operation of water-energy systems for small, off-grid islands," *Applied Energy*, vol. 250, pp. 605-616, 2019.
- [15] Taboada EB, Lozano LF, Vallente AS, Taboada JB, Querikiol EM, "Assessment and Preliminary Design Options for Feasible Renewable Energy-Water Supply Systems in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines," EU-ASEP-UNIDO-RETS Project, 2022.
- [16] Philippine Department of Energy, "List of existing power plants as of June 2020".
- [17] S. Lattemann and T. Hoepner, "Seawater Desalination: Impacts of Brine and Chemical Discharges on the Marine Environment," *Desalination Publications*, p. 142, 2003.
- [18] Regional Economic and Development Board, "Regional Physical Framework Plan: 2000-2030," ARMM, 2015.
- [19] IUSS Working Group WRB, "World Reference Base for Soil Resources," FAO, Rome, 2015.
- [20] F. Danielsen and C. G. Treadaway, "Priority conservation areas for butterflies (Lepidoptera: Rhopalocera) in the Philippine Islands," *Animal Conservation*, no. 7, pp. 79-92, 2004.
- [21] Asian Development Bank, "State of the Coral Triangle: Philippines," ADB, Mandaluyong City, Philippines, 2014.
- [22] M. Muailil, K. Adam, R. Muailil and L. de Guzman, "From fishing to farming in Sibutu Island, Tawi-Tawi," 2020.
- [23] R. Muailil, S. Mamauag, R. Cabral, E. Celeste-Dizon and P. Aliño, "Status, trends, and challenges in the sustainability of small-scale fisheries in the Philippines: Insights from FISHDA (Fishing Industries' Support in Handling Decisions Application) model," *Marine Policy*, vol. 44, pp. 212-221, 2014.

- [24] R. Suarez and P. Sajise, "Deforestation, Swidden Agriculture, and Philippine Biodiversity," *Philippine Science Letters*, vol. 3, no. 1, pp. 91-99, 2010.
- [25] Japan International Cooperation Agency, "Comprehensive Basic Study of the Autonomous Region in Muslim Mindanao in the Republic of the Philippines," 2003.
- [26] N. Hussain, A. Ali and L. Lazem, "Ecological indices of key biological groups in Southern Iraqi marshland during 2005-2007," *Mesopotamian Journal of Marine Sciences*, vol. 27, no. 2, pp. 112-125, 2012.
- [27] A. Preen, "Impacts of dugong foraging on seagrass habitats: observational and experimental evidence for cultivation grazing," *Marine Ecology Progress Series*, vol. 124, no. 19, pp. 201-213, 1995.
- [28] K. Serag, C. Elloran and K. Serag, "Tawi-Tawi Reef Fishes, Philippines Version 1.17," ASEAN Centre for Biodiversity, 2022.
- [29] Philatlas, "Sitangkai, Tawi-Tawi," [Online]. Available: <https://www.philatlas.com/mindanao/barmm/Tawi-Tawi/sitangkai.html>. [Accessed 06 Sep 2021].

## **ANNEXES**

### **ANNEX A. Professionals and organizations that have contributed to the preparation of the ESIA Report**

### **ANNEX B. List of consulted documents, including project-related reports and baseline data referred to in the report**

### **ANNEX C. Baseline data referred to in this report: Detailed project environment context**

### **ANNEX D. Baseline data referred to in this report: Terrestrial and marine flora and fauna**

### **ANNEX E. Record of consultation meetings with stakeholders**

### **ANNEX F. EIA-SEP Household Survey Report**



United Nations Industrial Development Organization

**PROPOSED PROJECT**  
**HARNESSING THE WATER-ENERGY-FOOD NEXUS TO ADDRESS**  
**AND ADAPT TO CLIMATE CHANGE IMPACTS IN TAWI-TAWI,**  
**PHILIPPINES**  
(UNIDO SAP ID 210194)

**CONSULTATION REPORT**

for the

**Environmental and Social Impact Assessment (ESIA) Studies**

Development and Rehabilitation of the Potable Water Supply and  
and an Improved Sanitation System in  
**Sibutu Island, Tawi-tawi, Philippines**  
and  
Development of a Desalination Facility Powered by 1.0 MWp Solar PV System for Potable  
Water Supply and an Improved Sanitation System in  
**Sitangkai Island, Tawi-tawi, Philippines**

**E.B. Taboada, A.S. Vallente, J.B. Taboada, M.K.O. Paler, J.A. Jaque,**  
**D.T. Jaque, and J.M.U. Lim**

ESIA Study Team

February 27, 2023

## Table of Contents

1. Introduction .....	4
2. Objectives .....	4
3. Consultation Strategy .....	4
4. Community Consultations and Engagement.....	6
5. Meetings with concerned government agencies and other stakeholders .....	7
6. Key Findings from Engagement and Consultation .....	13
7. Project Disclosure .....	19
Annex A. Pictures of the Consultation Meetings in Sibutu Island, Tawi-Tawi, Philippines.....	20
Annex B. Pictures of the Consultation Meetings in Sitangkai Island, Tawi-Tawi, Philippines .....	29
Annex C. Attendance Sheets for the Consultation Meetings in Sibutu Island .....	34
Annex D. Attendance Sheets for the Consultation Meetings in Sitangkai Island.....	39
Annex E. Agenda for the face-to-face Consultation Meeting with UNIDO, MinDa, and BARMM Officials.....	49
Annex F. Presentation slides during the face-to-face Consultation Meeting with UNIDO, MinDa, and BARMM Officials.....	50
Annex G. Photos and Attendance Sheets during the Consultation Meeting with UNIDO, MinDa, and BARMM Officials.....	75



## List of Figures

Figure 1. Different levels of engagement required for each stage of the project.....	5
--------------------------------------------------------------------------------------	---

## List of Tables

Table 1. Consultation meetings, FGDs, and KIIs in Sibutu Island.....	6
Table 2. Consultation meetings, FGDs, and KIIs in Sitangkai Island .....	7
Table 3. Consultation meetings with concerned government agencies and other stakeholders .....	8
Table 4. Summary of the discussion and action points of the meeting .....	8
Table 5. Summary of the discussion and action points of the face-to-face meeting .....	10
Table 6. Summary of the issues and concerns during the consultation in Sibutu Island and its suggested solutions .....	13
Table 7. Summary of the issues and concerns during the consultation in Sitangkai Island and its suggested solution .....	16

## 1. Introduction

The primary purpose of conducting the stakeholder consultation was to encourage the participation of important stakeholders and local people in the process of the project implementation and to integrate the appropriate environmental and social concerns into the process, to ensure that whatever negative impacts the project may cause, these will be identified and mitigated early on, especially as regards to environmental and social safeguards. Moreover, the Philippine law specifies that the stakeholder consultation process shall be an integral part of the environmental and social impact assessment, thus making it mandatory.<sup>1</sup> This report presents the stakeholder consultation process carried out for the proposed project in Sibutu and Sitangkai Islands, Tawi-Tawi, Philippines.

Initial meetings, key informant interviews (KIIs), focus group discussions (FGDs), Environmental Impact Assessment- Socio-economic Perception (EIA-SEP) household surveys, and consultations were held with the community and other stakeholder vis-a-vis local government officials, concerned regional government agencies officials, and community influentials. During the meeting, the project objectives were explained and elaborated. The stakeholders' concerns and suggestions were also documented and taken care of to further enhance the project's acceptability on environmental and social grounds. During the field visits, a series of consultations were carried out at various locations in the project areas, wherever convenient and comfortable with the stakeholders.

## 2. Objectives

The primary objectives of this activity is to:

- Inform the local people, leaders, and other stakeholders about the proposed project's goals and objectives, as well as its implementation plans;
- Seek views, concerns, and opinions of all people, including women, youth, indigenous people (as applicable), in the various areas concerning the project; and
- Establish if the local people foresee any positive or negative environmental and social effects or impacts that may be caused by the project, and if so, how they wish the perceived negative impacts to be addressed.

This is done through the following presentation flow:

- Introduction of the project and basis of its conceptualization;
- Creating awareness about the project including its possible impacts;
- Rapport building with local community champions (e.g., barangay officials);
- Involving them in the process of determining the right or suitable direction for the project development; and
- Assessment of the impacts which may occur and their mitigations approaches.

## 3. Consultation Strategy

Consultation and participation by the direct stakeholders require that accurate and reliable information is made available in a timely and comprehensible manner to all of them. It shall require

---

<sup>1</sup> According to the updated guidelines stated in the Environmental Management Bureau Memorandum Circular No. 2014-005 (EMB MC 2014-005) or the Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS (Presidential Decree 1586 of 1978, otherwise known as the Philippine Environmental Impact Statement System).

uniform understanding and awareness regarding activities among all stakeholder institutions to enable a unified and effective approach.



*Figure 1. Different levels of engagement required for each stage of the project*

The ESIA study team adopted the consultation strategy which covers three (3) broad phases of the project as shown in the **Figure 1**.

- **Stage 1. Project preparations and approvals.** This is the time from the initial inception of the proposal to the construction process given the final investment/funding decision of the proponents. The objectives of the consultation for this stage, which was done during the project site visits last December 5-16, 2022 and during the series of online/face-to-face meetings, are the following:
  - **INFORM.** Providing information about the proposed project and its potential impact were done during this stage. People’s understanding of how the project will operate and how it will be managed is clarified.
  - **CONSULT.** This is done to understand the concerns of the local community, the needs of the government and stakeholders, and how the project impacts individuals and the community in general.
  - **EVOLVE.** Using the information gathered through consultation, improvement of the planning and management of the proposed project should be implemented.
- **Stage 2. Construction.** The period from the final investment/funding decision until the commissioning of the project.
- **Stage 3. Operations.** The period from the start of operations and continuing throughout the expected life of the project.

It should be noted that the degree of participation required in a project would be directly proportional to the scale and magnitude of impact and the proposed mitigation measures. Hence, to ensure effective consultation and participation, the following principles are observed:

- **Continuous process.** Information dissemination on project developments and consultations with local communities and stakeholders would be a continuous process throughout project planning and implementation.
- **Inclusive.** The entire participative and consultative process should be inclusive. Special efforts to elicit the participation of vulnerable and disadvantaged groups in the community should be made.
- **Forum for decision-making.** Meetings, interactions, and consultations would aim to lead to informed decision-making.

#### 4. Community Consultations and Engagement

Community consultations as part of the ESIA process were done following the approaches presented above to obtain the views of the community members with respect to the environmental and social impacts in the project area. Key informant interviews (KIIs) and focus group discussions (FGDs) were employed for the initial consultation with local government officials in the barangay and municipal levels, and environment officials in Tawi-tawi, Philippines. These stakeholders were strategically chosen as they have direct mandates and established relations with their local constituencies, rendering the process of information dissemination and feedback acquisition more efficient and robust.

**Table 1** shows the dates of initial consultation meetings with all the government officials and the representatives of the 16 barangays in Sibutu Island including the municipal officials (mayor, secretary, and planning officer), the venue, and the number of participants present during the reconnaissance visits of the project team from December 5-16, 2022. Photo documentation and attendance sheets of the said meetings are included in **Annex A** and **Annex C**, respectively.

**Table 1. Consultation meetings, FGDs, and KIIs in Sibutu Island**

Date	Office/Institutions	Venue	No. of Participants	No. of Males	No. of Females
Dec 7, 2022	BLGU-Ligayan	Brgy Hall	5	4	1
Dec 7, 2022	BLGU-Ungus-Ungus	Brgy Hall	2	1	1
Dec 7, 2022	BLGU-Hji. Mohtar Sulayman	Brgy. Hall	2	2	0
Dec 7, 2022	BLGU-Tongehat	Brgy. Hall	1	1	0
Dec 7, 2022	BLGU-Taungoh	Brgy Chairman's Residence	1	0	1
Dec 8, 2022	BLGU-Tandubanak	Brgy Chairman's Residence	3	2	1
Dec 8, 2022	BLGU- Sheik Makdum	Brgy Chairman's Residence	2	2	0
Dec 8, 2022	BLGU-Tongsibalo	Brgy Chairman's Residence	1	1	0
Dec 8, 2022	BLGU-Nunungan	Brgy Chairman's Residence	1	0	1
Dec 8, 2022	BLGU- Sibutu Poblacion	Brgy Chairman's Residence	2	0	2
Dec 12, 2022	MLGU-Sibutu/Office of the Mayor	Municipal Hall	3	2	1
Dec 12, 2022	BLGU-Talisay	Brgy Chairman's Residence	2	1	1
Dec 12, 2022	BLGU-Ambulong Sapal	Brgy Hall	4	2	2
Dec 12, 2022	BLGU-Hji. Imam Bidin	Brgy Chairman's Residence	1	1	0
Dec 12, 2022	BLGU-Datu Amilhamja Jaafar	Brgy Hall	4	2	2
Dec 12, 2022	BLGU-Hji. Taha	Brgy Hall	1	1	0
Dec 12, 2022	BLGU-Imam Hji. Mohammad	Brgy Chairman's Residence	1	1	0
<b>TOTAL</b>			<b>36</b>	<b>23</b>	<b>13</b>

**Table 2** shows the dates of initial consultation meetings with all the government officials and the representatives of the 9 barangays in Sitangkai Island including the municipal officials, the venues, and the number of participants present during the reconnaissance visits of the project team from December 5-16, 2023. Photo documentation and attendance sheets of the said meetings are included in **Annex B** and **Annex D**.

**Table 2. Consultation meetings, FGDs, and KIIs in Sitangkai Island**

Date	Office/Institutions	Venue	No. of Participants	No. of Males	No. of Females
Dec 9, 2022	BLGU-Tongmageng	Residence of one Brgy Kagawad	6	6	0
Dec 9, 2022	BLGU-Sitangkai Poblacion	Brgy Hall	1	0	1
Dec 10, 2022	Liga ng mga Barangay-Sitangkai Chapter	Hadji Cannon Ahaja Sports Complex	116	74	42
Dec 11, 2022	IP (Sitangkai)	Residence of the IP President	1	1	0
Dec 11, 2022	BLGU-Tongusong	Brgy Chairman's Residence	1	0	1
Dec 11, 2022	BLGU-North Larap	Brgy Chairman's Residence	1	1	0
Dec 11, 2022	BLGU- South Larap	Community Center	2	2	0
<b>TOTAL</b>			<b>128</b>	<b>84</b>	<b>44</b>

It is noteworthy that on December 10, 2022, the team was invited and was able to present the project to the community during the Thanksgiving and Year-End Party of the *Liga ng mga Barangay* (League of Barangays)-Sitangkai Chapter, which was attended by the barangay officials of the 9 barangays in Sitangkai. It was a welcomed opportunity for the team to present the project to the community through its barangay officials and leaders.

The FGDs, KIIs, and consultative meetings were done in some barangays of Sitangkai during the field visit of the team in the island. It should be noted that Sitangkai has a different geographical situation from Sibutu. Sitangkai is composed of several islands and islets with Tumindao Island being the biggest island under Sitangkai. Barangays Tongmageng, Tongusong, North Larap, and South Larap are all located in Tumindao Island.

## 5. Meetings with concerned government agencies and other stakeholders

Consultation meetings with concerned government agencies such as the BARMM Ministry of Environment, Natural Resources, and Energy (MENRE) and its Environmental Management Service (EMS), Mindanao Development Authority (MinDA), Bangsamoro Autonomous Region of Muslim Mindanao (BARMM) were conducted as part of the ESIA process (see **Table 3**).

On November 4, 2022, the initial scoping meeting with the MENRE-EMS was held in Cotabato City and was attended by the Director of EMS and the Division Chief of the EMS-Permitting Division. The discussion points of the meeting were as follows:

- the permitting process flow of MENRE;
- the corresponding requirements for Certificate of Non-Coverage (CNC) and for the Environmental Compliance Certificate (ECC); and
- the corresponding cost of the permitting process and related activities.

In addition, on December 5 and 15, 2022, the meeting with the CENREO District I was conducted in their office in Bongao, Tawi-tawi, and was attended by its representatives. The main purpose of the meeting was to introduce the proposed project for both Sibutu and Sitangkai Islands. The scope, benefits, and impacts of the project were also discussed during the meeting. Data acquisition and verification processes especially on the environmental data for both islands were also initiated in the meeting.

**Table 3. Consultation meetings with concerned government agencies and other stakeholders**

Date	Office/Institutions	Venue	No. of Participants	No. of Males	No. of Females
Nov 4, 2022	MENRE- EMS	EMS Office, BARMM Compound, Cotabato City	3	3	0
Dec 5 and 15, 2022	CENREO Dist. I (Sibutu & Sitangkai)	MENRE Office, Bongao, Tawi-tawi	3	3	0
Jan 11, 2023	UNIDO and MinDA	Virtual (Zoom)	14	7	7
Feb 17, 2023	UNIDO, MinDA, BARMM	Waterfront Insular Hotel & Resort, Davao City	43	25	18
<b>TOTAL</b>			<b>63</b>	<b>38</b>	<b>25</b>

Furthermore, on January 11, 2023, a project consultation meeting was held with UNIDO and Mindanao Development Authority (MinDA). It was attended by the Project Manager of UNIDO, the Deputy Executive Director of MinDA, and the Director of the Planning, Policy, and Project Development Office of MinDA and its staff. The key discussion points of the meeting are summarized in **Table 4** and the meeting flow was as follows:

1. Presentation of the project briefs, project components, project activities, timelines, the corresponding budget per component, and the project structure by UNIDO;
2. Presentation of the project design and implementation plan and the update of the ESIA study by the lead consultant;
3. Open forum, Q&A, Discussion; and
4. Planning for the next consultation meeting with key high level BARMM officials.

**Table 4. Summary of the discussion and action points of the meeting**

Discussion Points	Action Points/Remarks
<p>The acquisition of the information and data needed by the project such as:</p> <ul style="list-style-type: none"> <li>• Data on climate hazards and future climate trends in the proposed project sites (Sibutu and Sitangkai) which can be taken from its respective climate and disaster risk assessments (CDRA), and from their local climate change action plan (LCCAP);</li> </ul>	<p>MinDA will facilitate the gathering of the data as it is working closely with concerned agencies in the BARMM region.</p>



Discussion Points	Action Points/Remarks
<ul style="list-style-type: none"> <li>the baseline or historical data on the loss and damage incurred by the identified areas especially those attributed to climate change, particularly on the seaweed industry; and</li> <li>Data on how the seaweed industry contributes to the economy (local, regional, or national);</li> </ul>	
A more comprehensive local benchmarking on the existing small-scale desalination plants in the country, especially in the BARMM region	MinDA will also facilitate this concern especially in the BARMM region.
Possible synergies of the proposed project with the other projects in Mindanao area (jurisdiction of MinDA) and other agencies in BARMM	MinDA expressed that synergies with other projects in the area are possible and that they can facilitate the flow of more information accordingly.
Business model for the proposed integrated water management system (water district) for both sites in Sibutu and Sitangkai Islands.	<p>Based on the consultation meetings with the community in both sites, the lead consultant recommended that a joint venture between the public sector (the LGU in this case) and the private sector can be facilitated for the water management system.</p> <p>In the said JV, the LGU will carry out their oversight function as they clearly expressed that they do not have the expertise to do the operation and maintenance of the water management system. The private sector will take charge of the whole operation and maintenance of the facility, by hiring suitable professionals and skilled workers to carry out the required tasks for the sustainability of the water system.</p>
Communal sanitation facility	The project scope afforded the establishment of a demonstration facilities or pilots in both sites. It was also discussed that a communal sanitation facility can be built for those in the fishing villages or “pondohan” but it will be beyond the scope of the project.
Communal rainwater harvesting facility	The project scope afforded the establishment of a demonstration facilities or pilots in both sites.
Studies on “willingness to pay” for water in both project sites	The lead ESIA consultant discussed that the community expressed their willingness to pay for the water and its corresponding water services as they recognized the need to sustain the system for the water supply and

Discussion Points	Action Points/Remarks
	distribution.
Salt-making from the brine discharge of the desalination as a mid-to-long-term mitigation plan	It was recommended that thorough studies be conducted to ascertain the feasibility of making salt (industrial or food-grade application) from the brine discharge of the desalination facility. The budgetary requirement for the feasibility studies and the establishment of the (pilot) salt-making facility in the area will be provided by the lead ESIA consultant, for further evaluation by the project team for its inclusion in the proposed project budget.
Knowledge-sharing activity on the process documentation of developing a water system project (e.g., desalination) was suggested by MinDA to be included as one of the activities under Project Component 1	This suggestion was noted and will be added accordingly.

Another project consultation meeting was held on February 17, 2023, with UNIDO, MinDA, and the concerned ministries of BARMM. The face-to-face meeting, which was held in Davao City, Philippines, was attended by the Project Managers (from Vienna, Austria) and Philippine Country Representative of UNIDO, the Executive Director and staff of MinDA, and the representatives of key ministries of BARMM such as MENRE, MAFAR, BPDA among others (see **Appendix G** for the complete list of attendees). The meeting agenda and the presentation of the consultants are found in **Appendix E** and **Appendix F**, respectively. The key discussion points of the meeting are summarized in **Table 5**.

*Table 5. Summary of the discussion and action points of the face-to-face meeting*

Discussion Points	Action Points/Remarks
Brine Effluent Management Plan for Sitangkai Desalination Facility	<p><u>Cost</u> The lead consultant emphasized that the cost of implementing the following activities related to brine management of the desalination system are not included in the project cost:</p> <ul style="list-style-type: none"> <li>• Salt-making; and</li> <li>• Conduct of the “apriori” feasibility study for the different options for brine management in the facility</li> </ul> <p><u>Monitoring</u> The monitoring of the mitigation measures for brine management mentioned in the ESMP shall be the responsibility of the entity that will manage and operate the desalination facility. It was recommended that a trained or skilled in environmental monitoring shall be hired accordingly. It was also emphasized in the discussion that the areas for brine disposal/dispersion are already identified and</p>

Discussion Points	Action Points/Remarks
	<p>geotagged. These areas will be the point of monitoring throughout the operation of the facility.</p> <p><u>Other Options</u> Other options for brine management such as constructed wetlands are also discussed during the meeting. However, for constructed wetland, it is deemed unviable for islands like Sitangkai.</p>
Desalination Facility Specifications	<p><u>Production Input/Output and Associated Cost</u> The presentation of the desalination system production input/output and its associated cost only showed seawater as the production input. Thus, projection of production input/output and its associated cost using brackish water must also be shown for comparison especially for the associated cost of production.</p> <p>The lead consultant explained that the use of seawater as input in the desalination process is intentional so as to set the expectation of the stakeholders. It was also emphasized that the use of brackish or groundwater as input will definitely bring down the per unit cost of water produced by the desalination facility.</p> <p>It was also suggested during the meeting to use groundwater as input for the desalination process since groundwater salinity is lower than that of seawater. When it comes to the desalination process, lower salinity entails lower power requirements and could result to lower cost. However, the project should consider the sustainability aspect of using groundwater in the area. Proper hydrological study must be conducted to ascertain the eventual effect of using the groundwater as desalination input in the area. Aside from that, it should be noted that majority of the people in Sitangkai uses the existing water sources in the area for their domestic (utility) water needs.</p> <p><u>Energy Recovery Device (ERD)</u> The technical specifications of the ERD must also be addressed by project team. Suggestion like the use of hydraulic-to-hydraulic method for the ERD is also noted accordingly.</p> <p><u>Smart Metering</u> Smart metering implementation for water distribution is also suggested during the meeting to promote efficiency and water conservation.</p>
Sustainability of the project (desalination facility)	<p><u>Willingness and capacity to pay</u> The willingness and capacity to pay of the community was already ascertained in the previous studies conducted for the project. However, to avoid problems on the collection of fees, behavioral</p>

Discussion Points	Action Points/Remarks
	<p>interventions is suggested to be implemented prior or during the operation of the facility.</p> <p><u>Fintech Application</u>  The utilization of the current and accessible financial technologies (fintech) for its financial transactions are also considered by the project. It was also aligned with the current talk for partnership of MinDA with Mastercard, one of the leading fintech providers in the Philippines. However, support infrastructures such as internet and data connections must also be installed or improved in the area to fully maximize the use of fintech.</p> <p><u>Management and Operation of the Water Districts</u>  It was also mentioned in the prior consultation meetings that the LGUs in the area acknowledged their lack of expertise in managing and running a water district and thus, expressed their willingness to explore feasible partnerships with the private sector for the management and operation of the water districts.</p> <p><u>Expansion of the desalination facility</u>  The design of the facility is modularized to ease the constraints for big scale operation and future expansion, which are projected to happen within the first year of operation of the desalination facility.</p> <p><u>Institutional strengthening</u>  Throughout the duration of the project, several activities will be conducted to strengthen the institutional capacity of the LGUs and its concerned stakeholders relative to water resource management.</p>

## 6. Key Findings from Engagement and Consultation

The flow of the meetings, FGDs, or KILs are as follows:

- Introduction of the team which is composed of two (2) senior experts, one (1) junior expert, two (2) training assistants from Mindanao State University-Tawi-Tawi College of Technology and Oceanography (MSU-TCTO) Office of Continuing Education and Extension Services (OCEANeS), one (1) staff from AIEC-ILAW, and one (1) community guide;
- Introduction and discussion of the proposed project:
  - For Sibutu Island, the development of the potable water supply and distribution system of the island, including the rehabilitation of its existing waterworks system, the establishment of an integrated water management system, and the sanitation system; and
  - For Sitangkai Island, the development of a desalination facility powered by 1.0 MWp solar PV system for potable water supply and distribution and an improved sanitation system;
- Discussion on the scope, the benefits, and the impacts of the project;
- Discussion about the solid waste management and sanitation concern on the island and how can it be addressed by the project or by the LGU; and
- Open forum and expression of support for the project.

**Table 5** presents the discussion summary of issues and concerns expressed by the barangay officials regarding their water supply and water distribution system, sanitation situation, and solid waste management in Sibutu Island:

**Table 6. Summary of the issues and concerns during the consultation in Sibutu Island and its suggested solutions**

Issues/Concerns	Suggested Solutions by the Project
<p>Water Sources - The majority of the barangays in Sibutu have groundwater sources. However, some barangay especially in the western portion of Sibutu have no groundwater sources as expressed by their barangay officials.</p>	<p>Sharing of water sources for some barangays will be explored through the design of the water distribution network of the project.</p> <p>Since rainwater is the major source of water in many households on the island, the idea of developing a communal rainwater harvesting system as one of the solutions for this issue is positively perceived by the barangay officials.</p>
<p>Water Quality - Admittedly, the BLGU, and MLGU disclosed there is no water quality testing conducted on the existing groundwater sources on the island. The only water quality testing conducted for some water sources on the island were conducted by the RETS Project.</p>	<p>Water quality testing of the identified groundwater sources on the island will be conducted accordingly to ascertain whether its safety and standards for drinking water. A water disinfection system is highly welcomed as an additional treatment feature of the water system to be included in the project.</p>

Issues/Concerns	Suggested Solutions by the Project
<p>However, only the identified groundwater sources in the eastern part of the island have been tested in 2021.</p>	
<p>Water Distribution System - Several barangays in Sibutu have already a water supply and distribution system infrastructure (concrete water tanks, pipelines, etc.) with Level II service but the majority of such systems are not operational due to the difficulty in doing maintenance works, especially on its motorized components coupled with their financial constraints.</p>	<p>Detailed assessment of the status and the rehabilitation needs of the existing water system infrastructure in several barangays in Sibutu will be conducted prior to the project implementation to ascertain the budgetary requirements for its rehabilitation and the water quality and quantity.</p>
<p>Sustainability and management of the waterworks system - With the experience of some barangay officials on failed projects involving water supply and distribution, they all expressed their concern about how to sustain the water supply and distribution system in their respective areas.</p>	<p>The project will establish an integrated water management system (IWRM) to promote the sustainability of the operation of the waterworks system on the island thru the organization of a water service provider (water district), who is tasked to manage the water supply system.</p>
<p>Role of the BLGU and MLGU in the project - The BLGU and MLGU asked about their roles in the project implementation and project operation during the consultation meeting, especially with the plan to establish an integrated water management system (IWRM thru as WSP) in the island.</p>	<p>A joint venture (JV) between the LGU and the private sector was suggested during the discussion about the integrated water management system (water districts). All the officials expressed their openness to this arrangement and recognized it as one way of promoting the sustainability of the system. The oversight function of the LGU was highlighted during the said discussion.</p>
<p>Cost of water service - After the discussion about the integrated water management system, questions about the cost of the water service then followed as this was also one of the major considerations of the households on the island as expressed by its barangay officials. They also recognized the need for payment to really sustain the water supply system in their municipality. They also added that they are all willing to pay for the water service as long as it is reasonable.</p>	<p>With the JV arrangement and the oversight function of the LGU in the management of the water supply system, the price for the water services is assured to be reasonable and affordable as compared to the current costs of water procurement paid by most households in Sibutu.</p>
<p>Household water connection - A question about how can the household avail or connect to the proposed water supply system was also aired during the consultation. It was also clarified whether a water meter will be used since water billing will be implemented.</p>	<p>It was clarified in the discussion that household connections will be arranged and paid by the household and not by the project just like how the household connects to TAWELCO for their electricity. Water meters will also be installed accordingly. However, the project thru the WSP can facilitate the installation of Level III water distribution system.</p>



Issues/Concerns	Suggested Solutions by the Project
<p>Sanitation - The majority of the barangay officials and even the municipal officials during the consultation meetings admitted that sanitation is a major concern in the island. They elaborated on the difficulty of their sanitation situation given the fact that there are many households built on stilts on the island. There are barangays that built a public toilet for the community but are not sustained because also of their water scarcity situation.</p>	<p>The idea of a communal sanitary toilet and septic tanks was introduced during the discussion with the barangay officials. It was received positively by them and affirmed that the said solution is feasible as long as it is designed properly and that there is sufficient water to maintain its cleanliness</p>
<p>Solid Waste Management - When it comes to solid waste management, the same sentiments regarding their sanitation situation were expressed by the barangay officials. They attempted to put up a landfill for their solid waste in the innermost part of the island, however, there was a problem with the collection of garbage. The barangays have no available garbage trucks to collect the solid waste and dump it in their designated landfill area. The current practice now is to throw the garbage to the sea and or construct a makeshift open pit to partly bury it.</p>	<p>Ideally, a sanitary landfill is not recommended in an island community like Sibutu. Several solutions could be implemented on the island like a modular waste-to-energy system that requires considerable budget allocation. However, initial works can be done on the island like the establishment of a material recovery facility (MRF) and the implementation of the Solid Waste Management System employing the Circular Economy principles (e.g., 6Rs).</p>
<p>Public Consultation - A question about a public consultation for the project was also raised in the consultation with the barangay officials.</p>	<p>The barangay officials are assured that another round of public consultations will also be conducted in the succeeding stages of project preparation and implementation.</p>

Generally, the government officials of the 16 barangays in Sibutu Island expressed very positive opinions regarding the proposed project as they perceive it to be beneficial to them, especially with the provision of a better supply and distribution system of potable water in their communities. Furthermore, the Municipal LGU represented by its Municipal Mayor together with the Municipal Planning and Development Officer also expressed their appreciation and positive opinion regarding the proposed project on the island and vowed to extend their full support during the project implementation.

**Table 6** presents the summary of issues and concerns expressed by the barangay officials regarding their water supply and water distribution system, sanitation situation, and solid waste management in Sitangkai Island:

**Table 7. Summary of the issues and concerns during the consultation in Sitangkai Island and its suggested solution**

Issues/Concerns	Suggested Solutions by the Project
<p>Water Sources - The identify and existing ground wells or dug wells in Sitangkai produced water that is not suitable for human consumption since it is brackish and salty.</p>	<p>The project will install a desalination facility on the island using reverse osmosis (RO) technology. It is expected to produce enough supply of fresh potable water for Sitangkai.</p> <p>Since rainwater is the major source of water in many households on the island, the idea of developing a communal rainwater harvesting system as one of the solutions for this issue is positively perceived by the barangay officials.</p>
<p>Water Sources - A question on where to source the water that will undergo the reverse osmosis process in the desalination facility was raised. It was then followed with a clarification if there will be permits needed for this was also expressed during the discussion.</p>	<p>A beach well (dug well) will be dug up to source the water that will undergo the RO process in the desalination facility. It was also clarified and emphasized that environmental compliance will be processed accordingly.</p>
<p>Water Quality - Admittingly, water quality testing was conducted for the existing water sources on the island through the RETS Project. The results show that it is not suitable for human consumption because of its high level of salinity.</p> <p>They also expressed their concern regarding the water quality of the water produced from the desalination facility once it is operational.</p>	<p>Once operational, cyclic water quality testing and monitoring of the water produced by the desalination facility will be conducted. Clearances and permits will also be processed before the water from the desalination facility are distributed to the community.</p>
<p>Water Distribution System - Some barangays in Sitangkai have already some water system infrastructure (concrete water tanks, pipeline, etc.) and a water distribution network with Level II service but the majority of such systems are not operational due to the difficulty in doing maintenance works, coupled with their financial constraints.</p>	<p>Detailed assessment of the status and the rehabilitation needs of the existing water system infrastructure in several barangays in Sitangkai will be conducted prior to the project implementation.</p>
<p>Sustainability and management of the waterworks system - With the experience of some barangay officials on failed projects involving water projects, they all expressed their concern about how sustainability of the facility.</p>	<p>The project will establish an integrated water management system to promote the sustainability of the operation of the desalination facility and the waterworks system on the island.</p>
<p>Impacts on the marine ecosystem - There was also a</p>	<p>It was clearly explained that brine disposal impact is</p>

Issues/Concerns	Suggested Solutions by the Project
<p>question raised regarding the impact of brine disposal from the desalination facility on the marine ecosystem in the area especially since most of the households are seaweed farmers.</p>	<p>considered unlikely to affect the marine ecosystem as the dilution of the brine effluent is expected over a short distance from the point of discharge.</p> <p>A monitoring regime that will track changes in the salinity level over and adjacent to the point of discharge will be put in place.</p> <p>Risks of damage to vegetation and salinity level of ground from leaks in the brine disposal system and failure of the desalination plant will remain but will be mitigated by improving the management and implementation of improved maintenance of the facility afforded by the capacity building and maintenance support of the project.</p>
<p>Added value of the project - There was also a question raised on the possibility of the use of brine effluent in making salt.</p>	<p>It was explained that this was outside the scope of the project but a recommendation to make prior studies for the said suggestion should be conducted.</p>
<p>Role of the BLGU and MLGU in the project - The BLGU and MLGU asked about their role in the project implementation and project operation during the consultation meeting, especially with the plan to establish an integrated water management system on the island.</p>	<p>The support and participation of the LGU in the project are key factors in its successful implementation and operation. This was emphasized during the discussion.</p> <p>A joint venture (JV) between the LGU and the private sector was suggested during the discussion about the integrated water management system (water districts). All the officials expressed their openness to this arrangement and recognized it as one way of promoting the sustainability of the system. The oversight function of the LGU was highlighted during the said discussion.</p>
<p>Cost of water service - After the discussion about the integrated water management system, questions about the cost of the water and its corresponding water service then followed as this was also one of the major considerations of the households on the island as expressed by its barangay officials. They also recognized the need for payment to really sustain the waterworks system in their municipality. They also added that they are all willing to pay for the water service as long as it is reasonable.</p>	<p>With the JV arrangement and the oversight function of the LGU in the management of the waterworks system, the price for the water and for the water services are assured to be reasonable and affordable as compared to the current cost of water procurement for most households on the island.</p>

Issues/Concerns	Suggested Solutions by the Project
<p>Disruption in the water distribution businesses - A question was raised about the impact of the operation of the desalination facility on the existing businesses that involved water distribution.</p>	<p>The project emphasized that it does not intend to compete with the existing water distribution businesses. The project encourages synergy as it is geared to address the community water needs - for the greater good.</p>
<p>Sanitation - The majority of the barangay officials and even the municipal officials during the consultation meetings admitted that sanitation is a major concern in the island. They elaborated on the difficulty of their sanitation situation given the fact that there are many households built on stilts on the island. There are barangays that built a public toilet for the community but are not sustained because also of their water scarcity situation.</p>	<p>The idea of a communal sanitary toilet and septic tanks was introduced during the discussion with the barangay officials. It was received positively by them and affirmed that the said solution is feasible as long as it is designed properly.</p>
<p>Sanitation - There was also a question on whether the said communal sanitation facility can be built for those fishing villages in the middle of the sea or commonly known as “pondohan.”</p>	<p>Those fishing villages or “pondohan” will benefit from the expansion of the project. It was mentioned during the discussion that the scope of the project can only build a demonstration facility for the said communal sanitation facility.</p>
<p>Solid Waste Management - When it comes to solid waste management, the same sentiments regarding their sanitation situation were expressed by the barangay officials. They attempted to put up a landfill for their solid waste in the innermost part of the island, however, there was a problem with the collection of garbage. The barangays have no available garbage trucks to collect the solid waste and dump it in their designated landfill area. The current practice now is to throw the garbage to the sea and or construct a makeshift open pit to partly bury it.</p>	<p>Ideally, a sanitary landfill is not recommended in an island community like Sitangkai. Several solutions could be implemented on the island like a modular waste-to-energy system that requires considerable budget allocation. However, initial works can be done on the island like the establishment of a material recovery facility (MRF) and the implementation of the Solid Waste Management System employing the Circular Economy principles (e.g., 6Rs).</p>
<p>Public Consultation - A question about a public consultation for the project was also raised in the consultation with the barangay officials.</p>	<p>The barangay officials are assured that another round of public consultations will also be conducted in the succeeding stages of project preparation and implementation.</p>

Generally, the barangay officials of the nine (9) barangays in Sitangkai appreciated the value of the proposed project for their community as they clearly perceived the benefits of having a desalination facility on the island. Furthermore, the Municipal LGU represented by the President of the *Liga ng mga Barangay*, who is a de facto member of the municipal council, and the IP

President, who also has a seat in the council, also expressed their appreciation and positive opinion regarding the proposed project on the island and bowed to extend their full support of the project implementation. Both bowed to champion the project in the council in the coming days.

## **7. Project Disclosure**

Relevant guidelines of UNIDO ESSPP prescribe that the affected population and institutions should be fully informed by disclosing the information relevant to the project impacts, the mitigation measures, and the project's key processes. Consultation with them is, therefore, the starting point for all the project-related activities to allay misgivings, misunderstanding, miscommunications, and apprehensions about the project. It is also undertaken to solicit the project's acceptability and ensure the participation of the community in the project planning and implementation. It is also providing the community with the opportunity to participate in key decisions of the project that are likely to affect them. To note, during the EIA-SEP household surveys, it was further expressed by the respondents that continued public consultations about the project be done during implementation.

**Annex A. Pictures of the Consultation Meetings in Sibutu Island, Tawi-Tawi, Philippines**



**Meeting with Ligayan Barangay Officials - December 7, 2022**



**Meeting with Ungus-Ungus Barangay Officials - December 7, 2022**





**Meeting with Hadji Mohtar Sulayman Barangay Officials - December 7, 2022**



**Meeting with Tongehat Barangay Chairman - December 7, 2022**



**Meeting with Taungoh Barangay Kagawad - December 7, 2022**



**Meeting with Tandubanak Barangay Officials - December 8, 2022**





**Meeting with Sheik Makdum Barangay Officials - December 8, 2022**



**Meeting with Tongsibalo Barangay Chairman - December 8, 2022**



**Meeting with Nunukan Barangay Chairwoman - December 8, 2022**



**Meeting with Sibutu Poblacion Barangay Officials - December 8, 2022**





**Meeting with Talisay Barangay Representative - December 12, 2022**



**Meeting with Ambulong Sapal Barangay Officials - December 12, 2022**



**Meeting with Hadji Imam Bidin Barangay Chairman - December 12, 2022**



**Meeting with Datu Amilhamja Jaafar Barangay Officials - December 12, 2022**





**Meeting with Hadji Taha Barangay Chairman - December 12, 2022**



**Meeting with Imam Hadji Mohammad Barangay Chairman - December 12, 2022**



**Meeting with the Office of the Mayor of Sibutu - December 12, 2022**



**Meeting with the Community Environment and Natural Resources Office- District 1 in Bongao, Tawi-Tawi - December 15, 2022**



**Annex B. Pictures of the Consultation Meetings in Sitangkai Island, Tawi-Tawi, Philippines**



**Meeting with Tongmageng Barangay Officials - December 9, 2022**



**Meeting with Sitangkai Poblacion Barangay Chairwoman and the Liga ng mga Barangay - Sitangkai Chapter President - December 9, 2022**



**Dr. Taboada, the lead consultant, presents the project during the Thanksgiving Party and Year-end Party of the Liga ng mga Barangay- Sitangkai Chapter**



**The crowd, majority composed of barangay officials of the 9 barangays in Sitangkai, during the presentation of Dr. Taboada**





**Meeting with IP President and the IP Representative in the Municipal Council (Sangguniang Bayan) of Sitangkai - December 11, 2022**



**Meeting with Tongusong Barangay Officials - December 11, 2022**



**Meeting with North Larap Barangay Chairman - December 11, 2022**



**Meeting with North Larap Barangay Officials - December 11, 2022**





**Meeting with the Community Environment and Natural Resources Office- District 1 in Bongao, Tawi-Tawi - December 15, 2022**

## Annex C. Attendance Sheets for the Consultation Meetings in Sibutu Island

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**  
**PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines**

### ATTENDANCE SHEET

ACTIVITY NAME: FOCUS GROUP DISCUSSIONS (FGDs) & KEY INFORMANT INTERVIEWS (KIIs) VENUE: LIGAYAN BRGY HALL JIBUTU, TAWI-TAWI DATE: DECEMBER 7, 2022

No.	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX	AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE	
							Y	N	Y	N		
1.	VALLENTI, ARBEN J.	29	M	F	UNIDO/AIEC-ILAW	PROJECT STAFF	0977-144-0301	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.	TABADA, EVELYN B.		M	F	UNIDO/AIEC-ILAW	PROJECT LEAD	0968-358-8006	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.	MASSAH M. SAPIB	31	M	F	BRGY. LIGAYAN	BRGY. SECRETARY	097539 09987 0910883092	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4.	NUK S. TAPSI	63	M	F	BRGY. LIGAYAN	BRGY. KAGAWAD		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.	KADAPAT A. HAMDAN	42	M	F	BRGY. LIGAYAN	BRGY. KAGAWAD	09475237873	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.	RID VILLANUEVA	57	M	F	ILAW	PROJECT COORDINATOR	09685262220	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7.	WILSON M. CATELO	55	M	F	BRGY. LIGAYAN	BRGY. WORKER	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8.	BENSAL Y. HAMDAN	28	M	F	BRGY. LIGAYAN	BRGY. WORKER	09572434004	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9.	BASIL M. IDRIS	60	M	F	BRGY. Ungur-Ungur	BRGY. KAGAWAD		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10.	SERING K. UMARI	51	M	F	BRGY. Mangostanyungur	BRGY. SECRETARY	09629371855	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11.	ALKHAID M. MUD	24	M	F	BRGY. Mangostanyungur	BRGY. CHAIRMAN	097088825092	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12.	NURJAAFAR M. KAMUH	31	M	F	BRGY. Mangostanyungur	BRGY. TREASURER	09700540074	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13.	Alkhalid S. Murih	39	M	F	BRGY. TONGHAT	Penang Barangay	09095066221	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14.	Arwana A. Latana	60	M	F	BRGY. Taungoh	BRGY. KAGAWAD	09109931342	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15.	WALID D. RAM	43	M	F	WISU TCTO	Training Assistant	09730216360	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16.	JEROME B. TABADA	49	M	F	UNIDO/AIEC-ILAW	Project Staff	09206997606	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17.	NUR-AMIN HOK		M	F	TAWELCO	Metor Rendu/ Guide	09509777661	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
18.			M	F				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines

ATTENDANCE SHEET

ACTIVITY NAME: FOCUS GROUP DISCUSSION (FGD) & KEY INFORMANT INTERVIEW (KII) VENUE: SIBUTA, TAWI-TAWI DATE: DECEMBER 8, 2022

	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX	AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE
							Y	N	Y	N	
1	TABOADA, EVELYN B.		M F	UNIDO/AIEC-ILAW	Project Lead/Consultant	09687588868	Y	N	Y	N	
2	VALLENTE, ARBEN S.	29	M F	UNIDO/AIEC-ILAW	Project Staff/Consultant	0977144901	Y	N	Y	N	
3	VILLANUEVA, RID		M F	ILAW	Project Coordinator	09685862620	Y	N	Y	N	
4	GERRY D. BELLAS	51	M F	TANDY BANAK <i>Group Secretary</i>	Grp. Secretary	0907410777	Y	N	Y	N	
5	ROMIO Z. JAHALUDAH		M F	TANDY BANAK	Chairman	09207967716	Y	N	Y	N	
6	MRSARA M. PANJI		M F	TANDY BANAK	Kagawad	09072808899	Y	N	Y	N	
7	AHMAD I DALUDAH		M F	SHIEK MAXOUM	KAGAWAD	09093433996	Y	N	Y	N	
8	Ali-Khan J. Hassan		M F	BLGU SHEIKHMAKDUUM	Chairman	09091946370	Y	N	Y	N	
9	JULASHRIE ANTANANI 62		M F	BRGY. TONGSIBALO	CHAIRMAN	09477253874	Y	N	Y	N	
10	HURUL-AIN SAPAL		M F	BRGY. NUNUKAN	CHAIRWOMAN	09639371954	Y	N	Y	N	
11	ZENDIRA G. ALPA		M F	BRGY. SIBUTA POB.	CHAIRWOMAN	09361533000	Y	N	Y	N	
12	Madgia Mohd		M F	BRGY. SIBUTA POB.	Secretary	09355008444	Y	N	Y	N	
13	KHALID D. ADAM	43	M F	MSU TOTO	Training Assistant	00302163602	Y	N	Y	N	
14	JEROME B. TABOADA	47	M F	UNIDO/AIEC-ILAW	Project Staff/Consultant	09200997000	Y	N	Y	N	
15	NUR-KHMIN ITOK		M F	TRANELCO	Meter Reader/ Guide	09509771661	Y	N	Y	N	
16			M F				Y	N	Y	N	
17			M F				Y	N	Y	N	
18			M F				Y	N	Y	N	



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines

ATTENDANCE SHEET

ACTIVITY NAME: FOCUS GROUP DISCUSSIONS (FGDs) & KEY INFORMANT INTERVIEW (KII) VENUE: JIBUTU, TAWI-TAWI DATE: Dec. 12, 2022

	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX	AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE
							Y	N	Y	N	
1	TABADA, EVELYN		M F	UNIDO/AIEC-ILAW	Project Lead	091687588168	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
2	TABADA, JEROME		M F	UNIDO/AIEC-ILAW	Project Staff	09206997606	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
3	VALENTE, ARBEN	29	M F	UNIDO/AIEC-ILAW	Project Staff	09771447001	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
4	ADAM, KHALID	43	M F	MSU-TCTD	Lead Enumerator/Guide	09702167602	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
5	Al-Fauad B. Joe	21	M F	BRGY. TALISAY	Brother of kag	0726427524	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
6	Selma B. Joe	66	M F	BRGY. TALISAY	Kagawad		<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
7	MOHAMMAD NUR KINA	47	M F	BRGY. AMBUTONG	Secretary	09974027529	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
8	Marites H Sapal	42	M F	BRGY. AMBUTONG	Kagawad		<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
9	Amile T. Selgundin	58	M F	BRGY. Ambutong	Kagawad	09069633274	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
10	CACBI I NAMI	70	M F	BRGY. AMBUTONG	Chairman	09533947883	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
11	MAR-MAR J. PATA		M F	BRGY. HSI. BIDIN	CHAIRMAN	09166474900	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
12	MISKIFA S. SANI		M F	BRGY. AMILHAMJA	SECRETARY	09152903500	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
13	SURIONA AIRBAS		M F	BRGY. AMILHAMJA	TREASURER	730199868	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
14	HASHIM KEBKIN		M F	BRGY. AMILHAMJA	KAGAWAD		<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
15	ABDULLA BUANDING		M F	BRGY. AMILHAMJA	KAGAWAD		<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
16	RASIL A. USID	52	M F	BRGY. HSI. TAWA	CHAIRMAN	09485994027	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
17	SABRIE J. SUWAK	47	M F	BRGY. IMAM HSI. MOHAMMAD	CHAIRMAN	09653185320	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
18			M F				<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**  
**PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines**

**ATTENDANCE SHEET**

ACTIVITY NAME: MEETING WITH SIBUTU MLGU -

VENUE: SIBUTU, TAWI-TAWI

DATE: DECEMBER 12, 2022

No.	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX		AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE
			M	F				Y	N	Y	N	
1	TABOADA, EVELYN		M	F	UNIDO/AIEC-ILAW	PROJECT LEAD	091687588668	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
2	TABOADA, JEROME		M	F	UNIDO/AIEC-ILAW	PROJECT STAFF	09206997606	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
3	VALLENTE, ARBEN		M	F	UNIDO/AIEC-ILAW	PROJECT STAFF	09771440301	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
4	MCH. NDE A. SAHAPA		M	F	SIBUTU - LOCAL GOVERNMENT UNIT	LEDIPO/Secretary	09482158344	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
5	ALVENZHOR B. NAMI	45	M	F	LGU-SIBUTU	MPDC	09363001404	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
6	NUR-FITRA P. AHATA		M	F	LGU-SIBUTU	MAYOR	09985437401	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
7			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
8			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
9			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
10			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
			M	F				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	



**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**

**PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines**

**ATTENDANCE SHEET**

ACTIVITY NAME: MEETING w/ CENRO DIST. 1

VENUE: MEURE, BONGAO, TAWI-TAWI

DATE: 12/15/2022

	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX		AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE
			M	F				Y	N	Y	N	
1	Taboada, Evelyn		M	F	UNIDO/AIEC-ILAW	PROJECT LEAD	09687584668	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
2	Taboada, Jerome		M	F	UNIDO/AIEC-ILAW	PROJECT STAFF	09206997606	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
3	Vallent, Arben	29	M	F	UNIDO/AIEC-ILAW	PROJECT STAFF	0977-44-1301	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
4	Adam, Khalid	43	M	F	MSU-TRD	LEAD ENUMERATOR/GUIDE	09502163602	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	N	
5	Jasli panasali	48	M	F	MEURE	FORGSTER II	09672467459	<input checked="" type="checkbox"/>	N	Y	<input checked="" type="checkbox"/>	
6			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	
			M	F				Y	N	Y	N	



## Annex D. Attendance Sheets for the Consultation Meetings in Sitangkai Island

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**  
**PROJECT TITLE: Harnessing the Water-Energy-Food Nexus to Address and Adapt to Climate Change Impacts in Tawi-Tawi, Philippines**

### ATTENDANCE SHEET

ACTIVITY NAME: FOCUS GROUP DISCUSSIONS (FGD) & KEY INFORMANT INTERVIEWS (KII) VENUE: SITANGKAI, TAWI-TAWI DATE: Dec 9, 2022 - Dec 10, 2022

No.	FULL NAME (Last Name, First Name, Middle Initial)	AGE	SEX	AFFILIATION/OFFICE/ SECTOR/BARANGAY	DESIGNATION/POSITION	CONTACT NO.	Agree for my personal data to be used for official PROJECT purpose only		Agree to take my photo, video, and audio recording for PROJECT public release		SIGNATURE
							Y	N	Y	N	
1	TABORDA, EVELYN B.		M	UNIDO/AIEC-ILAW	Project Lead/Consultant	091687558668	Y	N	Y	N	
2	TABORDA, JEROME		M	UNIDO/AIEC-ILAW	Project Staff/Consultant	09206997606	Y	N	Y	N	
3	VALLENTI, ARBEN S.	29	M	UNIDO/AIEC-ILAW	Project Staff/Consultant	09771440701	Y	N	Y	N	
4	VILLANUEVA, RIO		M	ILAW	Project Coordinator	09685862820	Y	N	Y	N	
5	BOYOK S. NUR	71	M	BRGY. Tongmangong	Tongmangong Kagawad		Y	N	Y	N	
6	GHIRITAN ELMIL	71	M	BRGY. TONGMANGONG	Kagawad	09059180392	Y	N	Y	N	
7	IMBARRA J. ANWARO	70	M	BRGY. TONGMANGONG	KAGAWAD	09058742058	Y	N	Y	N	
8	MOH. TAHL M. YUSOP	58	M	BRGY. Ambulong Sapul	Community Guide	0981-147-82650	Y	N	Y	N	
9	KIPAUD D. ASAN	43	M	KBU-TOTO	Lead Enumerator	0130163602	Y	N	Y	N	
10	Jordan M. G. Berran	34	M	BRGY. Tongmangong	BRGY. Secretary	0905172884	Y	N	Y	N	
11	Eddie G. Jufa	70	M	BRGY. Fagaymagan	BRGY. Kagawad	09350223525	Y	N	Y	N	
12	RODOLFO K. AHAYA	45	M	BRGY. Sitangkai Poblacion	ABC-President	09177915496	Y	N	Y	N	
13	Kornael A. Habaton	64	M	APAKI, Sitangkai, T-T	Puroong Barangay	09062030658	Y	N	Y	N	
14	HASID N. SAMMAH		M	BRGY. Tongmangong	BRGY. Kagawad	09577991674	Y	N	Y	N	
15	MARVIN J. ILAHAN		M	BRGY. Tongmangong	BRGY. Kagawad	09365108044	Y	N	Y	N	
16	R. HOSIN L. PAKSATA		M	BRGY. North Larap	BRGY. Captain		Y	N	Y	N	
17	AL-MADZHU U. KARUN		M	BRGY. South Larap	BRGY. Kagawad	09350202068	Y	N	Y	N	
18	YACOB S. KARUN		M	BRGY. South Larap		09102477311	Y	N	Y	N	

19.

The attached attendance sheets below is from the Liga ng mga Barangay- Sitangkai Chapter



## LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

“THANKSGIVING PARTY” YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex

### ATTENDANCE SHEET



BARANGAY SITANGKAI POBLACION	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. HJA. ROWENA KONG AHAJA			
Brgy. Secretary : Mr. MATTHEW ALBERT L. KONG JR.			
Brgy. Treasurer : Mr. RAM ROBERT B. SANA			
Kagawad 1 : Hon. MUBARIK A. SUBUHON			<i>[Signature]</i>
Kagawad 2 : Hon. ABDURAHMAN LADJA	09278557034	1:20	<i>[Signature]</i>
Kagawad 3 : Hon. AL-SHAIMA H. PALAHUDDIN		1:30	
Kagawad 4 : Hon. MUNDING Y. IBBIH	09350488365	12:30	<i>[Signature]</i>
Kagawad 5 : Hon. BEN J. ANGLI		1:00	<i>[Signature]</i>
Kagawad 6 : Hon. HJA. ANNA LIGAYA			
Kagawad 7 : Hon. NURSILYN A. HAIBIT	09330745087	1:20	<i>[Signature]</i>
BARANGAY PANGLIMA ALARI	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. JULWAHID U. NAWANG	09256865789		<i>[Signature]</i>
Brgy. Secretary : Mrs. ANANG A. AMING	0916631720		<i>[Signature]</i>
Brgy. Treasurer : Mrs. ELMINA S. KARAH	097516669687		<i>[Signature]</i>
Kagawad 1 : Hon. SABER SUHAILI	09355610868		<i>[Signature]</i>
Kagawad 2 : Hon. MHEDZFAR ASAD			<i>[Signature]</i>
Kagawad 3 : Hon. ELDANG BASA	09101369461		<i>[Signature]</i>
Kagawad 4 : Hon. NURSIBA ABDULA	09056929090		<i>[Signature]</i>
Kagawad 5 : Hon. HARBI SAHIBIL			<i>[Signature]</i>
Kagawad 6 : Hon. SHEREN ANGKAYA	09077068470		<i>[Signature]</i>
Kagawad 7 : Hon. ENNIE TAWASIL			

LIGA NG MGA BARANGAY | ATTENDANCE SHEET





## LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

"THANKSGIVING PARTY" YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex



### ATTENDANCE SHEET

#### BARANGAY DATU BAGUNDA PUTIH

	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. PUTLIH RASAM A. AWADI	0995726210	12:45	<i>Putli</i>
Brgy. Secretary : Mrs. DINHUA T. PAJJI	09559920573	1:45	<i>DP</i>
Brgy. Treasurer : Mrs. FERRY-GALE P. SOLIS	0906409108	1:30	<i>Ferry-Gale</i>
Kagawad 1 : Hon. HJA. WILMA K. AHAJA	09302302107	12:00	<i>Hja Wilma K. Ahaja</i>
Kagawad 2 : Hon. ELEANOR R. KINGKING	09979757294	12:30	<i>Eleanor R. Kingking</i>
Kagawad 3 : Hon. RENZIE T. LU	09657015213	12:00	<i>Renzie T. Lu</i>
Kagawad 4 : Hon. KALSUM A. KALBI	09358261348	12:00	<i>Kalsum</i>
Kagawad 5 : Hon. SAMORATA M. DAGGONG	09554292900	12:30	<i>Samorata M. Daggong</i>
Kagawad 6 : Hon. HJI. BAING T. ABUBAKAR	0965826039	12:35	<i>Hji Baing T. Abubakar</i>
Kagawad 7 : Hon. SHERHA S. MANGSAN	0973083897	12:30	<i>Sherha S. Mangsan</i>

#### BARANGAY IMAM SAPIE

	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. HJA. INTAN M. WERBLE	09066288210	12:30	<i>Hja Intan M. Werble</i>
Brgy. Secretary : Mrs. SORAYA S. ABDURAJAK	0953148883	12:30	<i>Soraya S. Abdurajak</i>
Brgy. Treasurer : Mr. ABDURAUUF MALABONG	09559269375	12:30	<i>Abdurauuf Malabong</i>
Kagawad 1 : Hon. LADJURI D. JABARAL	09350976271	12:30	<i>Ladjuri D. Jabaral</i>
Kagawad 2 : Hon. ALALMAKSUN L. SUBAANI			
Kagawad 3 : Hon. NADJIPHA M. ISMAEL	09364263593	12:30	<i>Nadjipha M. Ismael</i>
Kagawad 4 : Hon. KULSUM BOYOK	0953148883	12:30	<i>Kulsum Boyok</i>
Kagawad 5 : Hon. JUBAIDA ABBAS		12:30	<i>Jubaida Abbas</i>
Kagawad 6 : Hon. JASNI K. YUSOPH	09414205552	12:30	<i>Jasni K. Yusoph</i>
Kagawad 7 : Hon. ZENAIDA BUMPIN		12:30	<i>Zenaida Bumpin</i>



# LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

“THANKSGIVING PARTY” YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex



## ATTENDANCE SHEET

### BARANGAY SOUTH LARAP

	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. ALKASIR D. SAHIAL	09095580944	1:00 PM	Alkasir Sahial
Brgy. Secretary : HANJI O. BUTUAN			
Brgy. Treasurer : SITTI RAMLA J. MURAH			
Kagawad 1 : Hon. ALMADZNU U. KARUN	09380202068		
Kagawad 2 : Hon. YACOB S. KARUN	09102477311	1:00 PM	
Kagawad 3 : Hon. BENHAR K. HADJAIL	09096149863		
Kagawad 4 : Hon. SAPARI J. IBA	09473249653		
Kagawad 5 : Hon. HIYA A. YUSOP			
Kagawad 6 : Hon. TON S. ALLING	090744834834		
Kagawad 7 : Hon. RIDA B. ASSAN	RIDA		RIDA

### BARANGAY SIPANGKOT

	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. ARAFAT JUAINI	09658305917		
Brgy. Secretary : Mr. IBRAHIM DUGASAN <i>GARONA B. ALLAN</i>	09300027848	1:00 pm	
Brgy. Treasurer : ELMAN SALAHI	097053356209	1:00 pm	
Kagawad 1 : Hon. ALKAMSAR D. BALADJI			
Kagawad 2 : Hon. SABBULA BANDAHALA			
Kagawad 3 : Hon. TAN SIRAJAN	09659820817		
Kagawad 4 : Hon. DUGASAN ABDURAHIM			
Kagawad 5 : Hon. KASDIARUL JURKANAIN			
Kagawad 6 : Hon. JIM DAPLINAN	09700440211		
Kagawad 7 : Hon. ELISHA SARIHUL			





# LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

“THANKSGIVING PARTY” YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex



## ATTENDANCE SHEET

BARANGAY TONGGUSUNG	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. HJI. RUDY D. MADAMIN			
Brgy. Secretary : Mr. FAISAL T. HAMSAN			
Brgy. Treasurer : Mr. ALRASDIE I. AKMAD			
Kagawad 1 : Hon. RASID M. SAMMAH			
Kagawad 2 : Hon. ALLING B. HABIBON			
Kagawad 3 : Hon. KAMLUN J. MUTALIB			
Kagawad 4 : Hon. CHERELYN T. HUSSIN			
Kagawad 5 : Hon. MARVIN J. ILAHAN			
Kagawad 6 : Hon. ALVIN S. JULAID			
Kagawad 7 : Hon. JACKIA B. NULI			
BARANGAY TONGMAGENG	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. SAMILEE KONG PIANAH			
Brgy. Secretary : Mr. SUDERMAN G. BANNANG	09037712884		
Brgy. Treasurer : JAWARI P. ANNAO			
Kagawad 1 : Hon. AIMOY P. ILAHAN	09758225847		
Kagawad 2 : Hon. NUR BUYOK			
Kagawad 3 : Hon. EDDIE JULA			
Kagawad 4 : Hon. ATIKA MALIK	09651073140		
Kagawad 5 : Hon. IMBRAN ANNAO	09055242058		
Kagawad 6 : Hon. ABUNAWAS UYONG			
Kagawad 7 : Hon. ELMER GUIRITAN			





# LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

"THANKSGIVING PARTY" YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex



## ATTENDANCE SHEET

### BARANGAY NORTH LARAP

	CONTACT NUMBER	TIME	SIGNATURE
Punong Barangay : Hon. HASHIM PALMATA			<i>Hashim Palmata</i>
Brgy. Secretary : Mr. SADIKUL BANDAHALA			
Brgy. Treasurer : Mr. RASHIDIN J. MAING			
Kagawad 1 : Hon. RAJIS KADIL			
Kagawad 2 : Hon. TADING PALMATA			
Kagawad 3 : Hon. DESDIMONA J. ASMUN			
Kagawad 4 : Hon. SAMSUDDIN S. ABDULCAWI			<i>Samsuddin S. Abdulcawi</i>
Kagawad 5 : Hon. ALNOHMIN D. PANDAOG			
Kagawad 6 : Hon. MUSA M. SAYRINE			
Kagawad 7 : Hon. MUKRIE D. MUKSIN			

### SANGGUNIANG KABATAAN

	CONTACT NUMBER	TIME	SIGNATURE
SK Chair Poblacion : Hon. JOANNE-MAE S. PALAHUDDIN			
SK Chair Panglima Alari : Hon. ALFADZRIE MUKSAN			<i>Alfadzrie Muxsan</i>
SK Chair Datu Putih : Hon. MARKHAIMER K. ASJAD			
SK Chair Imam Saple : Hon. ONIZPA J. OMAR			
SK Chair South Larap : Hon. RFZIANE E. MOYON			
SK Chair Sipangkot : Hon. ALRADZINUR SALAHI	09356830864		<i>Alradzinur Salahi</i>
SK Chair Tonggusong : Hon. NURHALIZ B. NULI			
SK Chair Tongmageng : Hon. AILYN EJIN			
SK Chair North larap : Hon. SOPIA h. MUHAMAD			







# LIGA NG MGA BARANGAY – SITANGKAI CHAPTER

"THANKSGIVING PARTY" YEAR END PARTY 2022

December 10, 2022 1:00 to 5:30PM & 7:30 to 10:00PM @ Hji Ahaja Canon Sports Complex



## ATTENDANCE SHEET

NAME	CONTACT NUMBER	TIME	SIGNATURE
Jerry A. Muslimin	09651073144	12:30 PM	
ELWITA G. ABDUL	09069081123	12:30	
Madona A. Hji Sabni	09501991056		
Nurhida O. Alcati	090858812656		
Sharifa A. Mapula	09777763398	12:30pm	
ROVENA P. AHMAD BPAT TONGGANG	09778660360		
RUSLET PAUNDIMO BPAT II	09677212871		
ADZMIL LAUSIN BPAT TONGGANG	09757366075	12:30PM	
AL ETIN			AL
Suairi Sempal BPAT	09754578290		SUAIRI
Kilyn Wagner SK Tonggong BPAT	09653188032		
VINCENT ANOTAN BPAT T.			BONC
MADNACIL TONGGANG BPAT T.			
PUGIL ALIH BPAT T.			PUGIL
JUMRAEL MANDAI BPAT T.			JUMRAEL
KIDIL LATA			KIDIL
Markhainur K. Asyad SK chairman Dady phily			
Shermalyn W. Daniel	0926542486	1:00 pm	
XL-Jimhar S. Tampalat			
REXOR M. LAUDOSAN			Laudosan
Nurfaiza A. Hadjimanay			
Jasrul W. Skaras	09757631340		

Jimharija L. Tahil  
RIZMAR L. MAWALIS

LIGA NG MGA BARANGAY | ATTENDANCE SHEET

RIZMAR







Annex E. Agenda for the face-to-face Consultation Meeting with UNIDO, MinDa, and BARMM Officials



**HARNESSING THE WATER-ENERGY-FOOD NEXUS TO ADDRESS  
AND ADAPT TO CLIMATE CHANGE IMPACTS IN TAWI-TAWI**

**Adaptation Fund Project Consultation**

**February 17, 2023 01:00 PM**

**MEETING AGENDA**

**OPENING REMARKS**

**ASEC. ROMEO M. MONTENEGRO**  
Deputy Executive Director  
MinDA

**PRESENTATIONS**

- Project Brief
- Project Components
- Project Design
- Environment and Social Impact Assessment

**UNIDO**  
**UNIDO**  
**DR. EVELYN TABOADA, Consultant**  
**DR. EVELYN TABOADA, Consultant**

**Discussion**

**Way Forward**

**UNIDO**



United Nations Industrial Development Organization

**PROPOSED PROJECT**

HARNESSING THE WATER-ENERGY-FOOD NEXUS TO ADDRESS AND ADAPT TO  
CLIMATE CHANGE IMPACTS IN TAWI-TAWI, PHILIPPINES  
(UNIDO SAP ID 210194)

**Environmental and Social Impact Assessment (ESIA) Studies**

**E.B. Taboada, A.S. Vallente, J.B. Taboada, M.K.O. Paler, J.A. Jaque, D.T. Jaque, and J.M.U. Lim**  
*ESIA Study Team*

***Consultation Meeting with BARMM, MinDA, UNIDO***  
*February 13, 2023*  
*Davao City*

# Sibutu & Sitangkai Islands

- **Development and Rehabilitation of Physical Infrastructure:**
  - Water Treatment
    - a. Filtration
    - b. Disinfection by automated chlorination
    - c. Desalination
  - Water Distribution
    - a. Level II
    - b. Level III
  - Solar-powered systems
  - Sanitation system demos
  - Rainwater harvesting systems
- **Institutional Strengthening:**
  - Establish Water Service Provider (Water District)
  - Awareness and educational programs on sanitation and waste management
  - Knowledge management & sharing

## SIBUTU ISLAND

The map shows the following project locations and their associated photos:

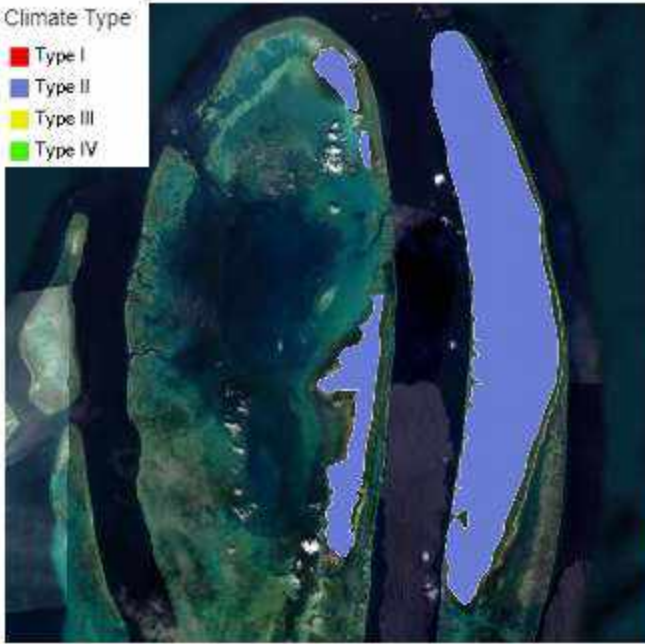
- Talisay**: Photos of a large black water storage tank and a concrete structure.
- Imam Hadji Mohammad**: Photos of a concrete structure and a building.
- Datu Amilhamja Jaafar**: Photos of a concrete structure and a building.
- Taungoh**: Photos of a concrete structure and a building.
- Hadji Mohtar Sulayman**: Photos of a concrete structure and a building.
- Ligayan**: Photos of a concrete structure and a building.
- Kaban-Kaban Pool**: Photos of a natural pool and a person holding a blue mobile phone.
- Tongsibalo**: Photos of a concrete structure and a building.
- Sheik Makdum & Tandubanak**: Photos of a concrete structure and a building.
- Tongehat**: Photos of a concrete structure and a building.



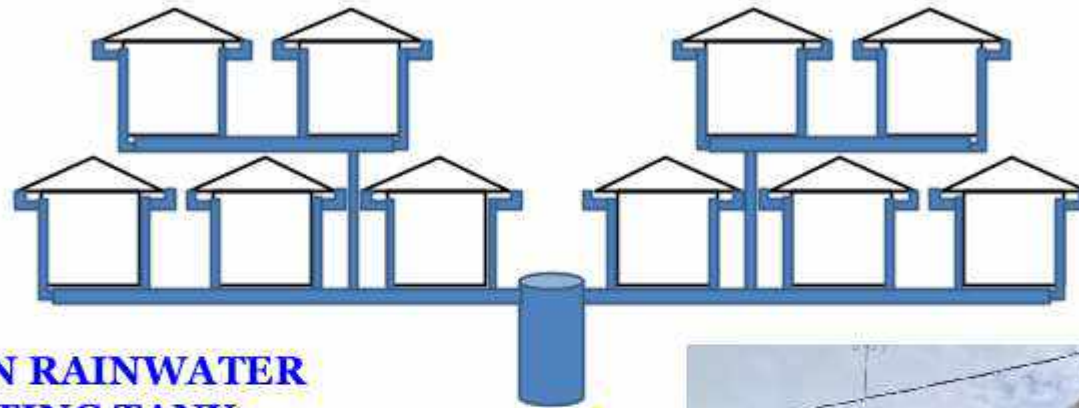
# Rainwater Harvesting in Sibutu & Sitangkai Islands

Climate Type

- Type I
- Type II
- Type III
- Type IV



## Communal Rainwater Harvesting Systems



### COMMON RAINWATER HARVESTING TANK:

- Cluster of households within 20-30 meter radius
- 8-10 houses per cluster
- Average of 1,200 sqm of roof area
- Average of 15 cu.m rainwater harvested per cluster
- Average of 2 days supply per communal rainwater harvesting tank





## Communal Rainwater Harvesting Systems



**Rainwater  
Harvesting  
Clusters along the  
coastline.**



**Rainwater  
Harvesting  
Clusters in a  
network of canals  
and bridges.**

## Improving Sanitation Systems



BARANGAYS	MUNICIPALITY	CATEGORY
Ambulong Sapal, Datu Amilhamja Jaafar, Hadji Mohtar Sulayman, Hadji Imam Bidin, Hadji Taha Imam Hadji Mohammad, Nunukan Sheik Makdum, Sibutu Poblacion, Talisay, Tandu Banak, Taungoh, Tongehat, Tongсібalo, and Ungus-ungus	SIBUTU	CATEGORY 1 (Comb-like network along coastline)
Ligayan (Tandu Owak)	SIBUTU	CATEGORY 2 (Web Network)
North Larap, South Larap, Tongmageng, and Tongusong	SITANGKAI	CATEGORY 1
Datu Baguindah Putih, Imam Sapie, Sitangkai Poblacion, Panglima Alari, and Sipangkot	SITANGKAI	CATEGORY 2



## Communal Sanitation Systems



### RECOMMENDATIONS:

- COMMUNAL TOILET
- COMMUNAL SEPTIC TANKS
- Cluster of households within 20-30 meter radius



### Notes:

- With improved water supply
- Community rainwater harvesting systems can augment supply
- Use of available brackish water

## Desalination Facility in Sitangkai Island

**PROJECT:** 1,000 CMD Seawater Reverse Osmosist (SWRO) Desalination Facility with 1 MWp Solar PV Power Plant

**SITE LOCATION:** Barangay Tongmageng, Sitangkai

**SITE COORDINATES:** 4°41'58.8"N 119°23'58.5"E





## Site Development Plan: Desalination Facility



SITE OPTION: 0.8 - 1 ha



Solar PV farm: 0.6 – 0.8 ha



OFFICE-STAFF HOUSE: 50 sqm



UF/RO CONTAINER VAN: 20ft



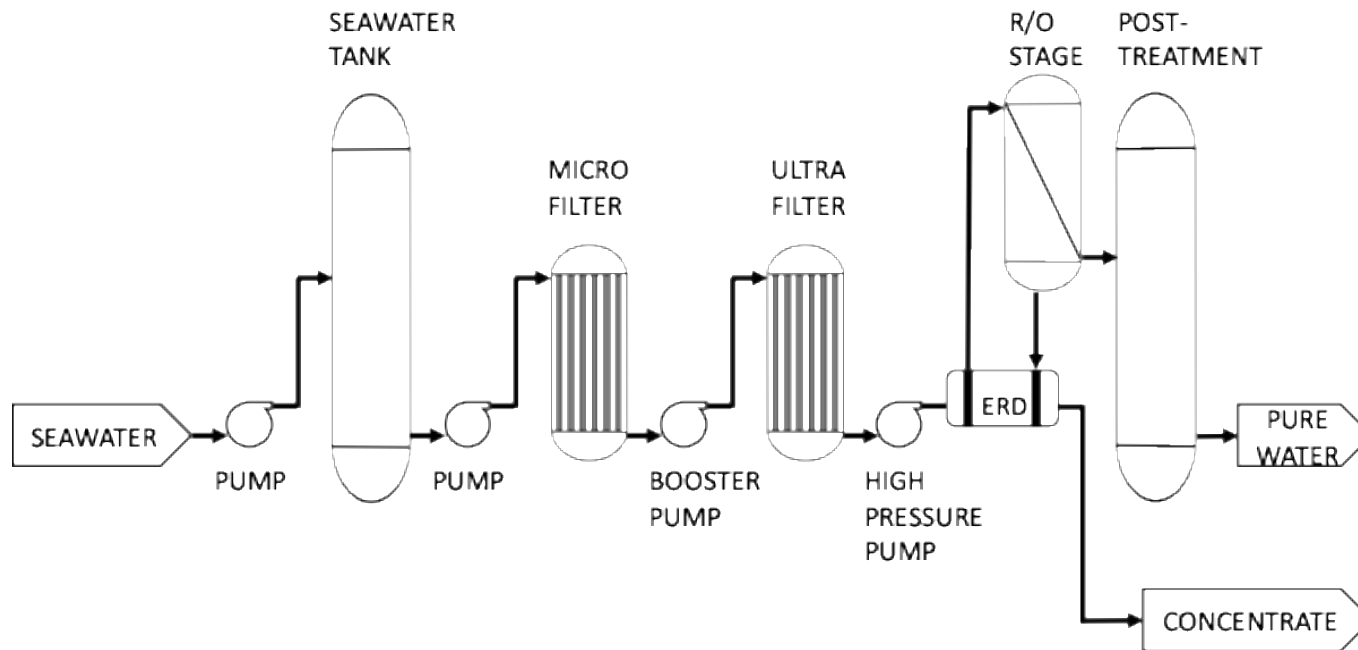
SW/UF/RO TANKS: 6m dia



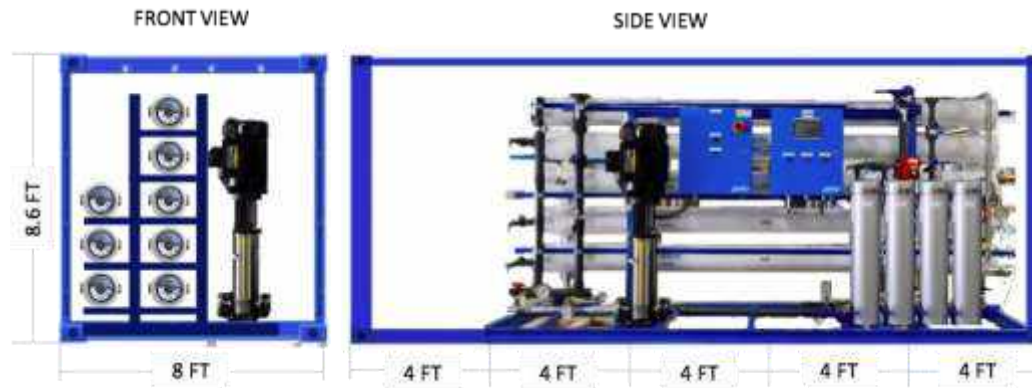
BESS/Inverter  
CONTAINER VAN: 20ft



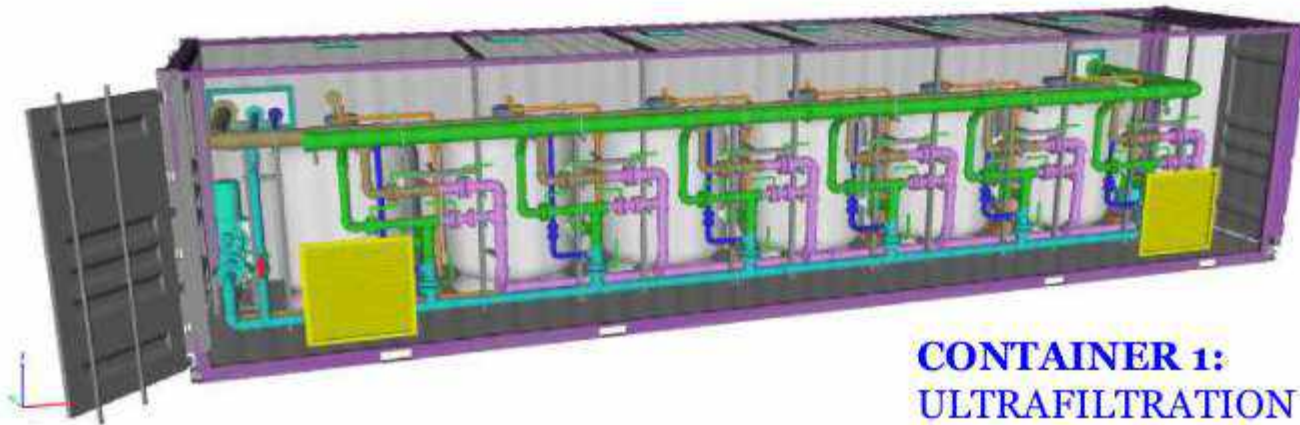
# Schematic Diagram of a Desalination Process



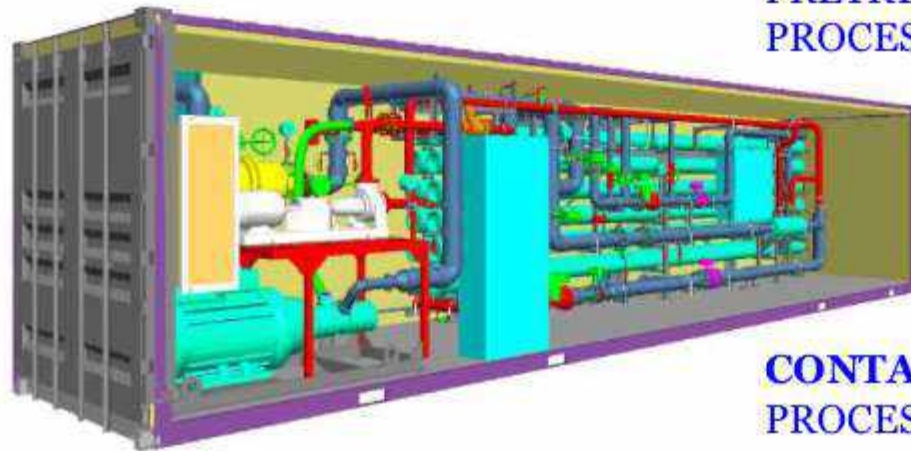
# Modular Desalination Facility



## Containerized Desalination Facility



**CONTAINER 1:**  
ULTRAFILTRATION  
PRETREATMENT  
PROCESS



**CONTAINER 2:** SWRO  
PROCESS

## Skid-mounted SWRO Desalination Facility

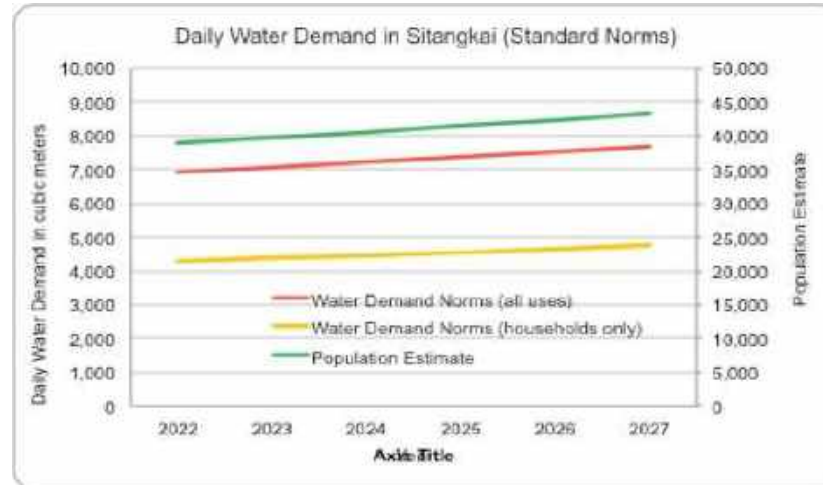
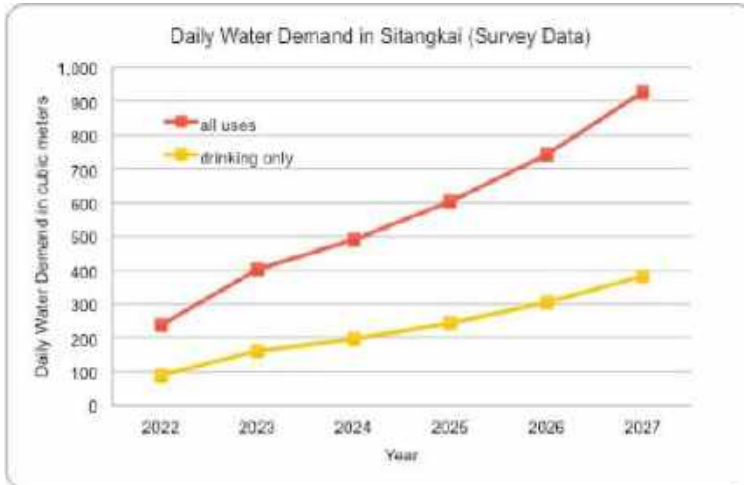


## Water Demand Norms based on Consumer Type

Consumer Category	Water Demand (liters/capita/day)
Households	100-120
Commercial	15-25
Institutional	15-30
Industrial	15-35
<b>Total</b>	<b>145-210</b>



# SITANGKAI Water Supply and Demand



## Current Drinking Water Price:

- P200-450 per 20-L container (purified/tap)
- P 500-1,000 per cbm (tap water)

## Water Demand at 110 l/c/d:

**4,281 CMD** → Level II-III supply and distribution in households

- **Water for other uses:** free, with transport costs
- **Level II** water supply (communal), **brackish, not potable, not within standards**

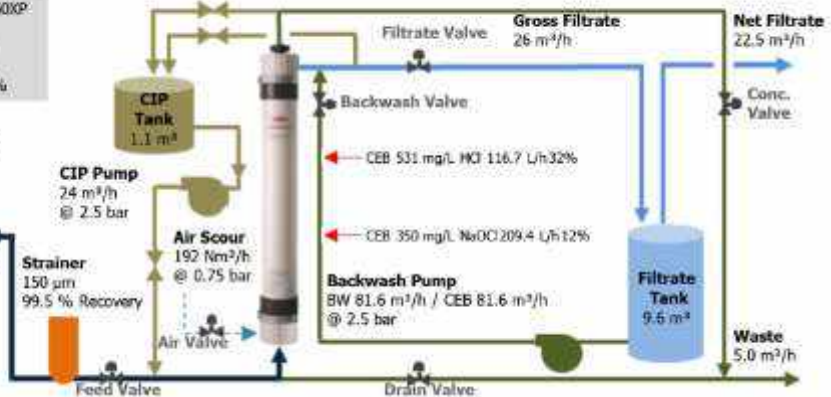
# Simulations using WAVE® Design Software

## UF Summary Report

Module: IntegraFlux SFD-2060XP  
 Total UF Trains: 1  
 UF Modules: 1 x 16 = 16  
 Operating Flux: 39 LMH  
 UF System Recovery: 81.9%

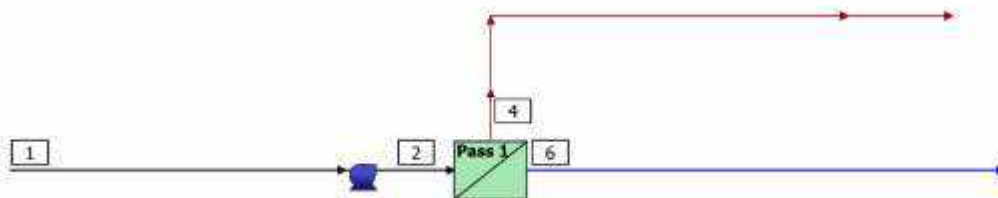
**Feed Water**  
 Average Feed Flow: 27.6 m<sup>3</sup>/h  
 Type: Sea Water  
 TSS: 0.0 mg/L  
 TOC: 0.0 mg/L  
 Turbidity: 0.0NTU

**Feed Pump**  
 Max 32 m<sup>3</sup>/h  
 @ 3.4 bar



## RO Summary Report

### RO System Flow Diagram



#	Description	Flow (m <sup>3</sup> /h)	TDS (mg/L)	Pressure (bar)
1	Raw Feed to RO System	22.5	32,881	0.0
2	Net Feed to Pass 1	22.5	32,940	43.3
4	Total Concentrate from Pass 1	13.5	54,726	42.2
6	Net Product from RO System	9.00	213.7	0.0

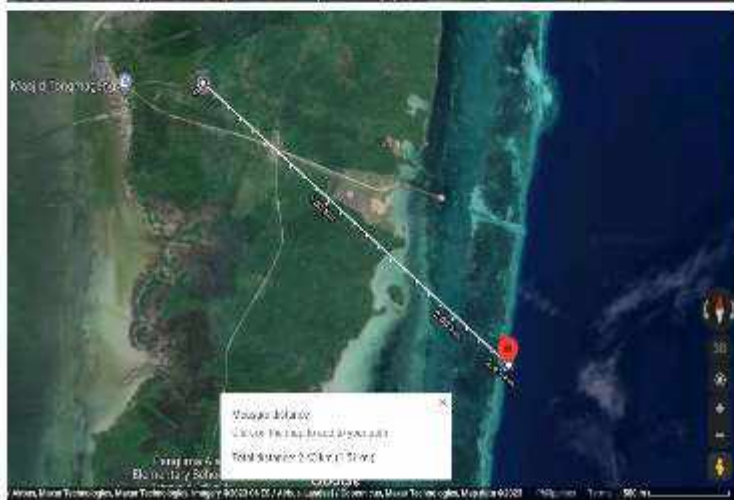
## Desalination (UF/RO) System Design

System		Output Capacity (m <sup>3</sup> /d or CMD)					
		200	500	750	1000	1250	2000
<b>Ultrafiltration (UF) System</b>							
# Trains		1	2	3	4	5	8
# Modules		16	36	54	72	90	144
System Flow Rate	(m <sup>3</sup> /h)	26.5	63.9	97.2	127.9	161.1	157.4
UF System Recovery	(%)	81.9	82.4	82.7	82.4	82.6	82.4
Operating Flux	(LMH)	39	40	41	40	41	40
TMP	(bar)	0.28	0.29	0.3	0.29	0.29	0.29
<b>Reverse Osmosis (RO) System</b>							
Raw Feed to RO	(m <sup>3</sup> /h)	22.5	52.5	79.9	104.9	132.3	209.6
Permeate TDS	(mg/L)	214	184	180.7	183.6	181.9	182.3
Feed Pressure	(bar)	43.3	44.8	44.9	44.8	44.9	46.1
Net Product from RO	(m <sup>3</sup> /h)	9	21	32	42	53	84
RO Recovery	(%)	40	40	40	40	40	40
# Pressure Vessels		3	6	9	12	15	24
# Membranes		18	36	54	72	90	144
Total Active Area	(m <sup>2</sup> )	736	1472	2209	2943	3679	5886
<b>Energy Requirements</b>							
Specific Energy	<b>(kWh/m<sup>3</sup>)</b>	<b>3.77</b>	<b>3.89</b>	<b>3.91</b>	<b>3.89</b>	<b>3.9</b>	<b>4.01</b>
Energy Requirement	(kWh/d)	754	1945	2932.5	3890	4875	8020

## Desalinated Water Cost Estimates

Parameters	Capacity of Desalination Facility	
	500 CMD	1,000 CMD
Equipment costs, PhP	70,000,000	100,000,000
Costs of ancillary equipment including storage tanks, pumps, distribution systems, and others, PhP	7,000,000	10,000,000
Costs of building platform structure and supporting facilities, PhP	5,000,000	5,000,000
Labor, installation, testing, logistics, startup, and other costs, PhP	7,000,000	10,000,000
<b>Total Capital Expenditures</b>	<b>89,000,000</b>	<b>125,000,000</b>
Interest Rate, %	15%	15%
Payback Period, yrs	5	5
<b>Estimated Annual Costs</b>		
Depreciation Costs, PhP/yr	18,608,949.76	26,136,165.39
Electricity costs, PhP/yr	13,961,250.00	27,922,500.00
Labor costs, PhP/yr	3,276,000.00	3,276,000.00
Repairs and maintenance cost, PhP/yr	930,447.49	1,306,808.27
Other costs, PhP/yr	465,223.74	653,404.13
<b>Total Annual Costs</b>	<b>37,241,870.99</b>	<b>59,294,877.79</b>
Water produced, cbm/yr	182,500	365,000
<b>Water Price (excluding taxes), PhP/cbm</b>	<b>204.07</b>	<b>162.45</b>

# Brine Effluent Management Plan



	DISCHARGE DISTANCE FROM SITE (KM)	COORDINATES
1	2.15	4°42'03.8"N 119°25'08.8"E
2	2.15	4°41'39.4"N 119°25'05.9"E
3	2.43	4°41'09.6"N 119°25'00.6"E



# Brine Effluent Management Plan



## DEPENDS ON:

- Physico-chemical properties of brine discharge
- Sensitivity of marine ecosystem

## MITIGATION:

- Dispersion or dissipation of brine to less than 1 PPT over small area (<20 m radius) with small nozzles

## MITIGATING OPTIONS:

1. Distribute the discharge through many ports;
2. Jet or nozzle the brine out.

## Mid- to Long-term Options:

1. Feasibility Study for Brine Reuse and Recycling, e.g. Salt making
2. Pilot Salt making from brine discharge



*Brine being discharged through a Jet*

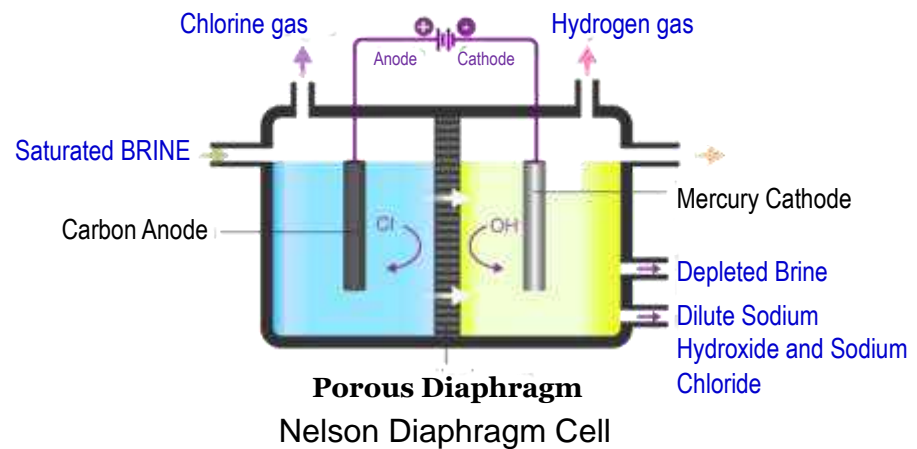
# Brine Effluent Management Plan

## “Apriori” Conduct of Feasibility Study

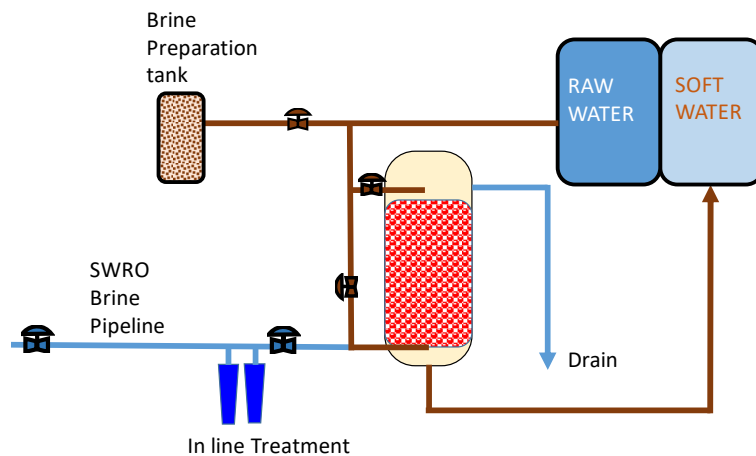
during desalination operation to:

- Determine actual physico-chemical properties of brine effluent especially heavy metal content, presence of toxic substances, composition, etc.
- Appropriate technological process
- Cost-efficiency
- Ease of operation

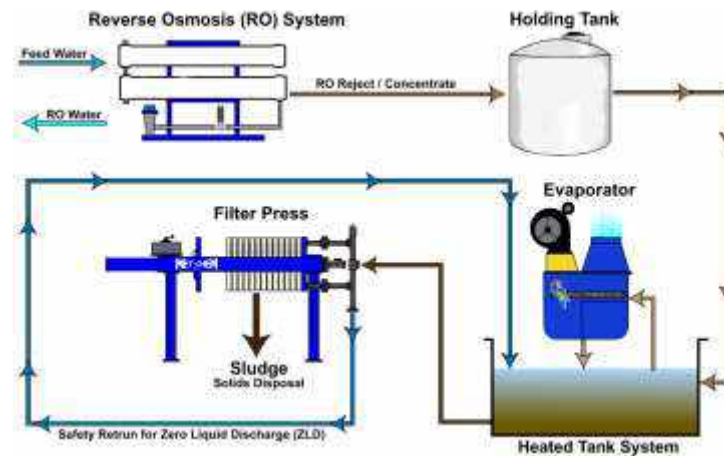
## ➤ Castner-Kellner Process: Production of Caustic Soda



## ➤ Proposed Regeneration of Resin using SWRO Brine



## ➤ Zero Liquid Discharge (ZLD) process of making Salt



# Environmental and Social Management Plan (ESMP)

Includes: Mitigation, Monitoring and Management during

- Design and pre-construction phase
- Construction phase
- Post-construction and operation phase



*Coordinates of marine sampling sites for the project's monitoring of seawater for sanitation impact studies in Sibutu Island.*



*Coordinates of marine sampling sites for the project's desalination facility in Barangay Tongmagang and monitoring of seawater for sanitation impact studies in Sibitkai Island.*



## Impact on Seaweed Farming Industry



## CONCLUSIONS

- SIBUTU and SITANGKAI Islands are **in dire need of sustainable water supply** to support the communities and their major livelihood – seaweed farming.
- There is an **urgent need to facilitate the implementation of the Renewable Energy-Water nexus** and sustain it thru **proper governance and management**.

## **Adaptation Fund: Project**

Harnessing the Water-Energy-Food Nexus to Address and Adapt to  
Climate Change Impacts in Tawi-tawi, Philippines  
(UNIDO SAP ID 210194)

- **Development and Rehabilitation of Physical Infrastructure:**
  - + **Water Treatment**
    - a. Filtration
    - b. Disinfection by automated chlorination
    - c. **Desalination** system (Sitangkai)
  - + **Water Supply and Distribution**
    - a. Level II
    - b. Level III
  - + **Solar-powered** systems
  - + **Communal Sanitation system** demos
  - + **Communal Rainwater harvesting** systems
- **Institutional Strengthening:**
  - + Establish **Water Service Provider (Water District)**
  - + Awareness and educational programs on sanitation (WASH) and solid waste management; **water-energy governance**
  - + **Knowledge management & sharing**





United Nations Industrial Development Organization



**PROPOSED PROJECT for ADAPTATION FUND**

**HARNESSING THE WATER-ENERGY-FOOD NEXUS TO ADDRESS AND ADAPT TO  
CLIMATE CHANGE IMPACTS IN TAWI-TAWI, PHILIPPINES  
(UNIDO SAP ID 210194)**

**Environmental and Social Impact Assessment (ESIA) Studies**

**THANK YOU VERY MUCH!**

Annex G. Photos and Attendance Sheets during the Consultation Meeting with UNIDO, MinDa, and BARMM Officials





# MINDANAO DEVELOPMENT AUTHORITY



## 4th Renewable Energy Technology to Improve the Value Added of Seaweed in Tawi-Tawi (RETS) Project Steering Committee Meeting, IPURE Project, and Adaptation Fund Stakeholders Consultation February 17, 2023 | Waterfront Insular Hotel, Davao City

	NAME	ORGANIZATION	GENDER		CONTACT NO.	EMAIL ADDRESS	SIGNATURE
			F	M			
1	Teddy Monroy	UNIDU		/	09178066602	T.Monroy@unidu.org	
2	Ede B. Sorian	PKSRS-DENR C.O.	✓		0977-7489842	edsorian@denr.gov.ph	
3	DOUGLAS GACASAN	PENT, INC.		/		per.t.gacas@gmail.com	
4	KAREN VARGAS	PENT, INC.	/		0917-820 3922		
5	ALEX LABARO	PENT, INC.		/			
6	Angelica Kaye G. Espe	MinDA	/		09674090300	angelikakaye.espe@minda.gov.ph	
7	Gasa Aldoa E. Pampang	MinDA	/		0933 954 968	gasaaldea.pampang@minda.gov.ph	
8	CARLOS J. CEREZA	JMO-V		/	0917 140-4396	carlos.cereza@jmo.gov.ph	
9	Erinly Mercado	EU	✓			erinly.mercado@ceas.unpd.eu	
10	Darwin Galang	DOE-MFO		/		dgalang@doe.gov.ph	
11	Diana B. Cabalinan	MinDA-OED	/				
12	Don Janel Bulata	MinDA-OO	/				





Republic of the Philippines  
Office of the President

## MINDANAO DEVELOPMENT AUTHORITY



**4th Renewable Energy Technology to Improve the Value Added of Seaweed in Tawi-Tawi (RETS) Project  
Steering Committee Meeting, IPURE Project, and Adaptation Fund Stakeholders Consultation**  
February 17, 2023 | Waterfront Insular Hotel, Davao City

	NAME	ORGANIZATION	GENDER		CONTACT NO.	EMAIL ADDRESS	SIGNATURE
			F	M			
13	YENA V. MACEUNTE	DOE - MFO	/		221- 0772	ymagkente@doe.gov.ph	
14	Martin Delgado	MINDA					
15	MADANIA P. MALANG. CASINO	MINDA	/		0917 126 9986	madanin.malang@minda.gov.ph	
16	SHELLA MAE B. ALMASA	MINDA	/		0948 482 9597	shellamae.almasa@minda.gov.ph mkc@minda.gov.ph	
17	POTPO, REY OLIVER	MINDA		✓	09493937769		
18	ANGCHAY, BENVE BOY	PURD		✓	09108740009		
19	RUEGO, DENNIS	PURD		✓	09156595050		
20	CEZAR TRINIDAD	PURD			0939938878		
21	NORHANIE A. PENOULT	MAFAR - BARMM	✓		0917 118 1080	fenmarjor@gmail.com	
22	BABY K. DINDO	MAFAR - BARMM	✓		09974230528	BabyDindo1994@gmail.com	
23	ROMEO M. MONTENEGRO	MINDA		/		romeo.montenegro@minda.gov.ph	
24	OMAR KHAN G. LABA	MENRE - BARMM	/		0926818750		

10<sup>th</sup> and 14<sup>th</sup> Floor, Pryce Building, Pryce Business Park,  
J.P. Laurel Avenue, Bajada, Davao City 8000, Philippines

[www.minda.gov.ph](http://www.minda.gov.ph)  
@MinDAGovPH

[fb.com/MinDAGovPHOfficial](https://www.facebook.com/MinDAGovPHOfficial)  
info@minda.gov.ph



4th Renewable Energy Technology to Improve the Value Added of Seaweed in Tawi-Tawi (RETS) Project Steering Committee Meeting, IPURE Project, and Adaptation Fund Stakeholders Consultation February 17, 2023 | Waterfront Insular Hotel, Davao City

	NAME	ORGANIZATION	GENDER		CONTACT NO.	EMAIL ADDRESS	SIGNATURE
			F	M			
25	ARPHIA EBUS	MAFAR- BARMM	/		09177204835	Arphiaebus@gmail.com	
26	Evelyn Taboada	-	/		09683588668	.	
27	Arben S. Vallente	-		/	09771440301	arbensvallenteii@gmail.com	
28	JEROME B. TABOADA	-		/	09206997606	jeromebtaboada@gmail.com	
29	PAMELA BORLAZA	UNIDO	✓		09177997711		
30	ADRIAN MEL B. DELOLA	DOE -MFO		✓	09165388052	amdelola@doe.gov.ph	
31	INDERAH M. CASAN	MINDA	/		09562345730	inderah.casan@minda.gov.ph	
32	KRISTEL STINE A. ABREGAS	MINDA	/		09062072606	kristelstine.abregas@minda.gov.ph	
33	Donney Tan	MINDA		/	09165208604	donneytan@minda.gov.ph	
34	EDUARDO LONGAKIT	MENRE	/		09959657114	ealong76@gmail.com	
35	ZURHAIDIN ENGLA	MENRE	/		09670088707	mho_89@yahoo.com	
36	MARTINUS ESPERATO	MINDA	/		0976778281		





Republic of the Philippines  
Office of the President

# MINDANAO DEVELOPMENT AUTHORITY



**4th Renewable Energy Technology to Improve the Value Added of Seaweed in Tawi-Tawi (RETS) Project Steering Committee Meeting, IPURE Project, and Adaptation Fund Stakeholders Consultation**  
February 17, 2023 | Waterfront Insular Hotel, Davao City

	NAME	ORGANIZATION	GENDER		CONTACT NO.	EMAIL ADDRESS	SIGNATURE
			F	M			
37	KRISTIAN KIEL ALBERTO	MINDA PND WM		/	09066657350	kristiankiel.alberto@minda.gov.ph	
38	ARULLAKATE C. USOP	MEURE - BARMM		/	0902215233	usopthare@gmail.com	
39	KADIL A. SULTAN JR	BPDA - BARMM		/	09130565002	jsulkaad@hotmail.com	
40	CESAR VOLEV	MINDA					
41	DEAYI RICHARD	MINDA		/		richard.deayi@minda.gov.ph	
42	STEPHAN FAJORDO	MINDA		/			
43	DIANA B. CAVALLIN	MINDA		/			
44							
45							
46							
47							
48							



## **Gender Assessment and Draft Gender Action Plan (GAP)**

**Harnessing the water-energy-food nexus to address and adapt to  
climate change impacts in Tawi-Tawi**

*Katharina Pröstler, with inputs from Evelyn Taboada*

*United Nations Industrial Development Organization | 21<sup>st</sup> June 2023*

## Annex 6: Gender Assessment and Draft Gender Action Plan (GAP)

### Index

<b>1</b>	<b>INTRODUCTION.....</b>	<b>2</b>
1.1	CONTEXT.....	2
1.2	OBJECTIVES OF THIS REPORT.....	2
1.3	RELEVANCE.....	2
1.3.1	GENDER AND THE AF.....	3
1.3.2	GENDER AND UNIDO.....	3
<b>2</b>	<b>METHODOLOGY.....</b>	<b>3</b>
2.1	GENDER QUESTIONS.....	4
2.2	DATA COLLECTION.....	5
<b>3</b>	<b>GENDER EQUALITY – BASELINE SITUATION IN PHILIPPINES.....</b>	<b>6</b>
3.1	CONTEXT.....	7
3.1.1	POLICIES AND COMMITMENTS.....	7
3.1.2	BASELINE DATA.....	10
3.1.3	CHILD MARRIAGE, DISCRIMINATION AND VIOLENCE.....	13
3.2	WHO HAS WHAT?.....	14
3.2.1	FINANCIAL (HOUSEHOLD) RESOURCES.....	14
3.2.2	LITERACY AND EDUCATION.....	14
3.2.3	ACCESS TO WATER.....	15
3.2.4	ACCESS TO ENERGY AND EMPLOYMENT IN THE ENERGY SECTOR.....	18
3.2.5	CLIMATE CHANGE.....	18
3.3	WHO DOES WHAT?.....	19
3.3.1	WATER.....	22
3.3.2	SEAWEED.....	23
3.4	WHO DECIDES?.....	26
3.5	WHO BENEFITS?.....	28
3.5.1	STAKEHOLDER ASSESSMENT.....	28
3.6	RECOMMENDATIONS FOR GENDER MAINSTREAMING: HOW CAN THE PROJECT IMPROVE GENDER EQUALITY AND WOMEN’S EMPOWERMENT?.....	35



# 1 Introduction

## 1.1 Context

The project will be implemented in the two island municipalities (Sitangkai and Sibutu) in the province of Tawi-Tawi, Bangsamoro Autonomous Region in Muslim Mindanao, Philippines. It is targeting the water security issue in these two island municipalities. One of the main income sources for the communities in the project area is seaweeds farming.

However, the islands are increasingly affected by climate change through a sea-level rise (saline water intrusion) and more unpredictable rains, impacting water resources available for the communities on the islands. The seaweed farming communities already face water insecurity, which will only get worse due to projected climate change impacts.

- The project seeks to increase adaptive capacity of the communities through provision of reliable, climate resilient access to water infrastructure and services.
- Also, it will strengthen livelihoods and sources of income of vulnerable seaweed producing communities through improvement of seaweed industry.
- It will build the capacity of the local government units (LGUs) in water management.
- Finally, the project activities will build awareness of adaptation and climate risk reduction strategies within local communities, as well as in the wider region.

Working with local communities the project will focus on developing and improving seaweed production strategies to cope with climate change impacts, including predicted environmental variability and utilising available water resources. This in turn will strengthen livelihoods and sources of income of vulnerable seaweeds producing communities in Tawi-Tawi.

It is estimated that a total of 71,562 people would benefit directly from the project (with 35,423 women and 36,139 men) and more than 150,000 people indirectly.

## 1.2 Objectives of this report

The objectives of this report are to:

- Identify and assess key gender dimensions, also including intersectionality, that are relevant for the project intervention;
- Provide key recommendations in form of a draft Gender Action Plan (GAP)
  - to ensure that the project implementation will enhance gender equality and women's empowerment, as well as youth engagement, using an intersectional approach, so that women and men, girls and boys, can equally lead, participate in, and benefit from the project activities and
  - to ensure that the project complies with the AF Gender Policy and UNIDO Gender Policy.

## 1.3 Relevance

Gender equality refers to the equal rights, responsibilities and opportunities of women and men, girls and boys. Gender equality implies that the interests, needs and priorities of both women and men are taken into consideration, recognizing the diversity of different gender groups. Gender equality is not a women's issue but should consider men as well as women. Equality between women and men is seen both as a human rights issue and as a precondition for, and indicator of, sustainable development. While the world has achieved progress towards gender equality and women's empowerment, women continue to suffer discrimination and violence in every part of the world. Gender issues need to be addressed by creating equal rights and opportunities for women in the workplace and in the households. This includes creating adequate physical and social infrastructure and safe working conditions responding to the specific needs of women.

This project has been identified as a project that has "Gender equality and/or the empowerment of women (GEEW) is the main focus" according to the **Gender Marker (2B)** used in categorizing UNIDO projects. It has the potential to significantly contribute to gender equality and/or women's empowerment and have a transformative impact on women's challenges and barriers, reducing women's drudgery. These projects possess multiple entry-points for gender

mainstreaming activities and/or affirmative action, and explicitly state gender equality and/ or women's empowerment as a principal objective. Gender equality and/or women's empowerment is not only a secondary objective.

### 1.3.1 Gender and the AF

According to the Gender Policy and Action Plan of the Adaptation Fund<sup>1</sup>: The Fund's MTS updates and refines the Fund's mandate to better serve the evolving needs of Parties to the UNFCCC. It articulates the Fund's own Theory of Change including the vision, goal, impact, mission, strategic foci and cross-cutting themes. The Fund's gender policy and its mandates are an integral part of the Fund's strategic focus and underlying theory of change. Without a commitment to gender equality, the Fund's vision, goal, and desired impact cannot be realized.

All of the Fund's activities (its processes and projects/programmes) are to be designed and implemented with the following four cross-cutting themes in mind: 1) engaging, empowering and benefiting the most vulnerable communities and social groups; 2) advancing gender equality and the empowerment of women and girls; 3) strengthening long-term institutional and technical capacity for effective adaptation; and 4) building complementarity and coherence with other climate finance delivery channels.

### 1.3.2 Gender and UNIDO

*Institutional Commitment and Accountability:* The importance of gender equality and women's empowerment is at the core of UNIDO's mandate and governed by the UNIDO policy on Gender Equality and the Empowerment of women (2019) and the UNIDO strategy for Gender Equality and the Empowerment of Women, 2020-2023. Enhancing the role of women as drivers of poverty reduction and recognizing the link between gender equality and safeguarding the environment all promote inclusive and sustainable industrialization, and directly contribute to SDG 9 on industry, innovation and infrastructure, and to SDG 5 on gender equality.<sup>2</sup>

The interlinkages between gender and industry are also recognized in Goal 9 and the Lima Declaration on ISID, which both emphasized the role industry can play in promoting decent employment, opportunities for social inclusion and gender equality, and the empowerment of women. UNIDO abides by the fundamental principle of non-discrimination on the basis of sex, as established in the United Nations founding Charter of 1945 and the 1948 Universal Declaration on Human Rights and as reconfirmed through inter alia the Convention on the Elimination of All Forms of Discrimination against Women of 1979 the 1995 Beijing Declaration and Platform for Action and the 2030 Agenda commitments relating to gender equality and the empowerment of women and girls.

The UNIDO vision, as laid down in the 2019 Policy on Gender Equality and the Empowerment of Women (DGB/2019/16), is that women and men equally lead, participate in, and benefit from all project interventions. Towards this vision, UNIDO follows a comprehensive approach to gender equality and the empowerment of women, recognizing the interests, needs and priorities of both women and men and the intersecting diversity of different groups.

*Institutional capacity on gender mainstreaming:* All UNIDO staff have knowledge on gender through mandatory trainings such as of the UN Women online course 'I know Women' modules 1-2-3 and 15. Moreover, specific training took place for staff on the energy-gender nexus, the UNIDO gender policy and strategy, internal processes on gender mainstreaming.

## 2 Methodology

The methodology used in this report has been derived from the UNIDO Gender Mainstreaming tools developed for GEF projects<sup>3</sup> and the gender guidance Document for Implementing Entities on Compliance with the Adaptation Fund Gender Policy<sup>4</sup>.

---

<sup>1</sup> <https://www.adaptation-fund.org/document/opg-annex4-gender-policy/>

<sup>2</sup> [Gender equality and the empowerment of women | UNIDO](#)

<sup>3</sup> [https://www.thegef.org/sites/default/files/documents/UNIDO\\_Gender\\_Mainstreaming\\_Analysis\\_Tool.pdf](https://www.thegef.org/sites/default/files/documents/UNIDO_Gender_Mainstreaming_Analysis_Tool.pdf)

<sup>4</sup> [https://www.adaptation-fund.org/wp-content/uploads/2022/10/AF-gender-guidance\\_Sep-2022.pdf](https://www.adaptation-fund.org/wp-content/uploads/2022/10/AF-gender-guidance_Sep-2022.pdf)



During the project preparation phase, potential gender equality and women’s empowerment challenges and opportunities have been identified taking intersectionality into account through a desk based analysis and information gathered from consultations and discussions with women from communities and project stakeholders. Through these, specific needs and priorities of women and youth were identified, as well as potential gender-related risks and impacts, including possible concerns regarding proposed project activities.

In addition to household surveys, special discussions (key informant interviews - KIIs) were conducted with women alone or girls alone, by women enumerators or female project team members, in order to create a safer space and time for women and girls to discuss gender-related issues and women concerns, what is commonly called “girls talk”. The KIIs were normally conversational and unstructured, just following the flow of conversation as to where it leads, however, there is a list of topics which served as guide in the process.

The gender assessment has been conducted to identify potential project gender equality and women's and youth empowerment issues, but also opportunities. The outcomes are summarized in this document and have been integrated into the project proposal.

Based on the gender assessment a draft gender action plan has been developed including an initial data baseline, which will be validated, finalized and approved during project inception to ensure that progress towards GEEW results are being tracked and can be measured.

## 2.1 Gender questions

The following set of questions (Table 1) has been developed to assess the baseline situation for this project in Philippines and identify potential challenges and drivers to mainstream gender equality in the project activities.

**Table 1: Questions to assess the baseline situation**

<b>What is the context?</b>	<ul style="list-style-type: none"> <li>● What are the gender norms and values in Philippines, in particular in the relevant communities, in general and seaweed/ water sector in particular?</li> <li>● What are commonly held beliefs, perceptions, and stereotypes relating to gender?</li> <li>● What are the legal requirements (laws, policies) and national commitments related to gender equality? What gender equality commitments have been made by the government, for instance in the framework of the SDGs? Is there a law and/or a policy on gender equality in the country?</li> <li>● Are there gender policies and action plans relevant available on water supply and aquaculture sector in general or in the seaweed sector specifically?</li> <li>● Are energy, water and aquaculture policies gender blind in the country? Are there policy documents or agreed gender assessments available that provide information and statistics on the gender gaps and priorities?</li> <li>● Are there specific relevant laws and regulations in the targeted communities?</li> <li>● Is gender-disaggregated data available, e.g. use/access/ownership of seaweed farms; women and men's representation in the sector (roles), use/access to clean water, etc.?</li> </ul>
<b>Who has what?</b>	<ul style="list-style-type: none"> <li>● Do women and men have equal access to clean water?</li> <li>● Do women and men have equal access to resources including finance (e.g. money to pay for clean water, fertilizer, pesticides), technologies (e.g. a harvesting technologies), information, and services?</li> <li>● How are the knowledge, training and education levels among women and men?</li> </ul>
<b>Who does what?</b>	<ul style="list-style-type: none"> <li>● What is the division of labour among women and men in Philippines in general and seaweed production in particular?</li> <li>● How are the specific gender roles in the seaweed production value chain?</li> <li>● How do women and men's traditional activities affect their needs and priorities? For example, what proportion of women's time is spent collecting water? Do women have different needs for clean water supply?</li> <li>● What are the potential professional growth and business opportunities in the energy and seaweed sector for women and men?</li> <li>● Is there any association promoting gender equality in water/energy/ aquaculture sector in the country?</li> <li>● Who are the key players in the country that help to promote gender equality and women’s empowerment (GEEW) in the water, aquaculture and energy sector and how can they be engaged in the project?</li> </ul>
<b>Who decides?</b>	<ul style="list-style-type: none"> <li>● At the household level, who takes decisions about resources and activities?</li> <li>● Is there an equal participation of women and men in the political sphere?</li> <li>● Is there an equal participation of women and men in investment decision making?</li> </ul>

	<ul style="list-style-type: none"> <li>• Are there decision makers (in Government, Parliament) who are ready to champion gender equality and women’s empowerment in water and seaweed production?</li> <li>• Are governmental institutions responsible for women’s and gender issues, involved in decision-making at national policy and planning levels?</li> </ul>
--	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

In addition, a second set of questions has been formulated to identify how the project can integrate gender mainstreaming issues and monitor progress against a set of indicators.

**Table 2: Questions to improve the project contribution towards gender mainstreaming**

<b>Who benefits?</b>	<ul style="list-style-type: none"> <li>• Will the services and technologies provided by the project be equally available and accessible to both women and men?</li> <li>• Is the design of the water system likely to be inclusive and gender-responsive?</li> <li>• What role will the pilot demonstrations play in helping women and men to fulfil their traditional tasks/responsibilities?</li> </ul>
<b>How can the project improve gender equality and empower women?</b>	<ul style="list-style-type: none"> <li>• Which outputs/activities have the largest potential impact on women?</li> <li>• How can outputs/activities be designed to improve gender equality and empower women? Is it necessary to offer specific services targeted at women?</li> <li>• Are there any gender related risks or potentially adverse impacts and how to avoid or minimize them?</li> <li>• Which gender specific targets and/or sex-disaggregated indicators can be developed to measure performance and impact? Which data can be collected throughout the programme to monitor the impacts for women and men (for example, sex-disaggregated user surveys, feedback/complaints channels, direct observation of infrastructure use)?</li> <li>• How gender aware are project stakeholders and is it necessary to raise awareness on gender dimensions of staff in relevant government agencies?</li> </ul>

## 2.2 Data collection

National information and data about the gender situation in Philippines was collected based on the following databases:

- The Human Development Reports (United Nations Development Programme - UNDP)<sup>5</sup>;
- The Gender Data Portal (World Bank Group - WBG)<sup>6</sup>;
- The Institute for Statistics UNESCO (United Nations Educational, Scientific and Cultural Organization).<sup>7</sup>
- Demographic and Health Surveys (DHS) Statcompiler.<sup>8</sup>
- World Bank: Women, Business and the Law.<sup>9</sup>
- Inter-Parliamentary Union (IPU).<sup>10</sup>
- UNICEF DATA.<sup>11</sup>
- World Bank, Development Research Group (PovcalNet).<sup>12</sup>
- World Bank’s Entrepreneurship Survey and database.<sup>13</sup>
- World Bank, Doing Business project.<sup>14</sup>
- World Health Organization, Global Health Observatory Data Repository/World Health Statistics.<sup>15</sup>

<sup>5</sup> <http://hdr.undp.org/en/humandev>

<sup>6</sup> <http://datatopics.worldbank.org/gender/country/moldova>

<sup>7</sup> <http://data.uis.unesco.org/>

<sup>8</sup> <https://www.statcompiler.com/>

<sup>9</sup> <https://wbi.worldbank.org/>

<sup>10</sup> [www.ipu.org](http://www.ipu.org) . For the year of 2020, the data is as of August 1, 2020.

<sup>11</sup> <http://www.data.unicef.org/> as of August 30, 2020.

<sup>12</sup> <http://iresearch.worldbank.org/PovcalNet/index.htm>

<sup>13</sup> <http://www.doingbusiness.org/data/exploretopics/entrepreneurship>

<sup>14</sup> <http://www.doingbusiness.org/>

<sup>15</sup> <http://apps.who.int/gho/data/node.main.1?lang=en>

- International Labour Organization, ILOSTAT database.<sup>16</sup>

Data collection is also based on a desktop review including a comprehensive review of national laws and commitments on Gender and a review of the gender studies relevant for this project, such as those analysing gender dimensions of energy, seaweed value chain, and the water-energy nexus.

The information provided by these statistical databases and desktop-review has been supplemented by findings from discussions with relevant stakeholders.

**Table 3 Stakeholders consulted to develop the gender analysis**

Type of Stakeholder	Specific Stakeholders
UN Agencies	- UNIDO
National Government agency level	- Mindanao Development Authority (MINDA) - Department of Energy (DOE) - Department of Environment and Natural Resources (DENR) - Climate Change Commission (CCC)
Local Government Level	- Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)
	- Bangsamoro Women Commission and its local counterparts
	- Provincial Government of Tawi-Tawi
Community level	- Local Government of Sibutu and Sitangkai
	- Barangay Governments (16 for Sibutu; 9 for Sitangkai)
	- Community-based organizations (sectoral and cause-oriented groups)
	- Mindanao State University (MSU) Tawi-Tawi

### 3 Gender Assessment

The project is in the **Bangsamoro Autonomous Region of Muslim Mindanao (BARMM)**. It is the only region of the Philippines that has its own government. BARMM’s population is about 4.4 million based on the 2020 Census. This represents 16.78% of the overall population of Mindanao, or 4.04% of the entire population of the Philippines.<sup>3</sup> The region first obtained special autonomous status in 1990, with the right to elect its own officials, levy taxes, and set education and development policy.<sup>4</sup>

BARMM is one of the poorest regions in the country, due to continuing armed conflict, limited livelihood opportunities, inadequate social services, weak institutions, and deep political, cultural and economic inequity, and generations of systemic injustice and armed violence. The region faces serious development challenges that must be overcome.<sup>5</sup> It holds one of the highest levels of infant and maternal mortality and one of the lowest life expectancies. Also literacy is much lower than in the rest of the country.

<sup>16</sup> <https://ilostat.ilo.org/> Data retrieved in September 20, 2020



Typical stilt houses in Sibutu and Sitangkai communities, living in extreme poverty. The bamboo or wooden floors are usually extended to their front or back yards where household chores and seaweed-related activities are carried out.

## 3.1 Context

### 3.1.1 Policies and commitments

The Philippines' ratification of **CEDAW** has contributed massively to the advancement and empowerment of the Filipino women.

The 1987 Constitution paved the way for at least two important laws: **Women in Development and Nation Building Act**, which was signed into law in 1992; and the **Magna Carta of Women** (Republic Act 9710), which was signed into law in 2009. The **Magna Carta of Women** which is a comprehensive women's human rights law that seeks to eliminate discrimination against women by recognizing, protecting, fulfilling, and promoting the rights of Filipino women, especially those in the marginalized sectors. The Acts also promote women's participation and representation in political and other decision-making bodies and processes, recognize gender mainstreaming (or integrating gender equality and women's concerns) in government as an implementation strategy, and provide the basis for the inclusion of a **gender and development (GAD)** budget in the national budget law, which began with the 1995 General Appropriations Act.<sup>17</sup>

Besides this landmark legislation, the Philippines have several other laws, measures and instruments that protect women from discrimination and violence as can be seen in the table below.

In 1997, the GAD-NFP sponsored the establishment of employee-focused programs. Noteworthy of these were support for the initial operation of the DOE Day Care Center, the first to have earned a five-star rating from the Department of Social Welfare and Development (DSWD), and the conduct of livelihood training courses for interested women and male employees. Five years later, the operation and maintenance of the day care center was fully institutionalized and the DOE regular budget began covering its costs. In recent years, the GAD-NFP has also successfully integrated gender and women's concerns in key policies of the Department, such as the Philippine Energy Plan, 2012–2030.<sup>24</sup>

The Philippine government adopted the **Philippine Plan for Gender Responsive Development (PPGD)** 1995-2025, a 30 year strategic plan that translated the Beijing Platform for Action into policies, strategies, programs and projects for Filipino women. To operationalize the PPGD, the Philippine government, with its partners in the non-government organizations, and the academe formulated the Framework Plan for Women (FPW) in 2001. The FPW has the following three (3) priority areas: (i) promotion of women's economic empowerment, (ii) protection and advancement of women's rights, and (iii) promotion of gender responsive governance. The Philippines is one of the few countries in the world that has adopted a **GAD Policy Budget** that requires all government agencies (including local government units) to utilize at

---

<sup>17</sup> DOE Toolkit for the Energy Sector

**least five percent** of their respective total budgets for programs, activities and projects that address the needs and uphold rights of women. The programme on Gender and Development (GAD) requires a **minimum 35% participation rate of women in community programmes** across the environmental sector.

Moreover, Women’s and Children’s Desks and Services (Philippine National Police, Department of Health, Department of Social Welfare and Development, National Bureau of Investigations, Commission on Human Rights, local government units, etc.) have been established.

The Philippines has many good practice policies and objectives and has passed gender-sensitive legislation; however, it continues to struggle to operationalize these through specific, targeted actions so as to deliver real outcomes for women.<sup>17</sup>

**Table 4. International Commitments on Gender**

International Commitments on Gender	Description
Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)	The Philippines is one of the 189 countries that ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) adopted in 1979 and described as a landmark international bill of rights of women. <sup>18</sup> The Philippines was the first ASEAN country to ratify the Convention (on August 5, 1981). Additionally, the Philippines ratified the Optional Protocol to the CEDAW on November 12, 2003. A Philippine representative, Leticia Ramos-Shahani, prepared the first draft of CEDAW adopted by the United Nations as a basic working paper.
Beijing Platform for Action (BPfA)	The Philippines played a vital role in crafting the BPfA as it was a Filipina who chaired the Main Committee that negotiated the Platform. The BPfA flagged 12 key areas where urgent action was needed to ensure greater equality and opportunities for women and men, girls and boys by laying out concrete ways for countries to bring about change. The country continues to actively participate in the succeeding sessions that assess BPfA implementation every 5 years. <sup>19</sup>
Sustainable Development Goals 5: Gender Equality	In September 2015, the Philippines together with other UN member states adopted the 2030 Agenda for Sustainable Development, replacing the eight (8) Millennium Development Goals (MDGs) which concluded that year. Seventeen (17) goals, which include Goal 5 to “Achieve gender equality and empower all women and girls”, were adopted as a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. <sup>19</sup>
Commission on the Status of Women (CSW)	Through PCW and the Department of Foreign Affairs – UN and other International Organizations (DFA-UNIO), the Philippines participates in the annual sessions of the UN Commission on the Status of Women (CSW). The UN CSW is the principal intergovernmental body exclusively dedicated to the promotion of gender equality and the empowerment of women. It is also mandated to lead the monitoring and review of the implementation of the BPfA and contribute to the follow-up of the SDGs. Every UN CSW main session considers a priority theme and a review theme, which are the focus of the outcome document or Agreed Conclusions. <sup>19</sup>
UNFCCC Gender Action Plan	The Philippines has recognized the need to identify the “differential impacts of climate change on men, women, and children” as mandated under its Climate Change Act of 2009. In addition, the Philippines, through the Climate Change Commission, has issued Resolution 2019-001 on the implementation of the National Climate Risk Management Framework, which aims to systematically identify, quantify and address the country’s climate change risks as a basis for systematic anticipatory climate change adaptation. Further, in its NDC formulation, gender mainstreaming opportunities are systematically being undertaken to harness the significant potential contribution of women in greenhouse gas (GHG) mitigation towards sustainable development. Moreover, the Climate Change Commission has issued Resolution 2019-02 to strengthen gender-based approaches in the formulation and implementation of climate change policies, plans, programs, and activities in the country, including the generation of sex-disaggregated data and conduct of gender analysis <sup>19</sup>

**Table 5. National Policies and legislations for Philippines**

National Policies and legislations on Gender	Description
----------------------------------------------	-------------

<sup>18</sup> [International Commitments | Philippine Commission on Women \(pcw.gov.ph\)](https://pcw.gov.ph/international-commitments)

<sup>19</sup> [201904231521---PHL Submission - Gender and Climate Change.pdf \(unfccc.int\)](https://unfccc.int/201904231521---PHL-Submission-Gender-and-Climate-Change.pdf)



Magna Carta of Women	RA 9710 is a comprehensive women's human rights law that seeks to eliminate discrimination through the recognition, protection, fulfillment, and promotion of the rights of Filipino women, especially those belonging in the marginalized sectors of the society. <sup>16</sup> The Magna Carta of Women was enacted on August 14, 2009 and took effect on September 15, 2009.
Prohibition on Discrimination Against Women	RA 6725 Prohibits discrimination with respect to terms and conditions of employment solely on the basis of sex. <sup>20</sup>
Anti-Violence Against Women and Their Children Act of 2004	RA 9262, or An Act Defining Violence Against Women and Their Children, Providing Protective Measures for Victims, Prescribing Penalties Therefore and for Other Purposes, recognizes the need to protect the family and its members particularly women and children, from violence and threats to their personal safety and security. <sup>16</sup>
Assistance for small-scale women entrepreneurs	RA 7882, or the act that states the Provision of Assistance to Women Engaging in Micro and Cottage Business Enterprises, and for other purposes. <sup>16</sup>
Anti-Sexual Harassment Act of 1995	RA 7877 addresses the issue of sexual harassment committed in employment, education or training environment. <sup>16</sup>
The Anti-Rape Law of 1997	RA 8353 states that any person having carnal knowledge of a woman through force, threat, or intimidation or by means of fraudulent machination or grave abuse of authority will be punished. <sup>16</sup>
Rape Victim Assistance and Protection Act of 1998	RA 8505 declares the policy of the State to provide necessary assistance and protection for rape victims. <sup>16</sup>
RA 11313 Safe Spaces Act	Bawal Bastos Law
REPUBLIC ACT NO. 7882 PROVIDING ASSISTANCE TO WOMEN ENGAGING IN MICRO AND COTTAGE BUSINESS ENTERPRISES, AND FOR OTHER PURPOSES	This law seeks to provide assistance to Filipino women in their pursuit of owning, operating and managing small business enterprises.
Gender Equality and Women's Empowerment (GEWE) Plan 2019-2025	The Gender Equality and Women's Empowerment (GEWE) Plan 2019-2025, which covers four years of the Philippine Development Plan (PDP) 2017-2022, and the remaining years of the Philippine Plan for Gender-Responsive Development (PPGD) 1995-2025. The GEWE Plan contains strategic actions that: concretize the government's commitments to fully implement the Magna Carta of Women (MCW) or RA 9710, contribute to the inclusive human development goal of the PDP 2017-2022 and the collective vision of AmBisyon Natin 2040, move the country closer to the achievement of the long-term vision of gender equality and women's empowerment, particularly as articulated in the PPGD 1995-2025, facilitate the implementation of the country's international commitments to gender equality and women's empowerment, particularly the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), the Beijing Declaration and Platform for Action (BPfA), the UN Security Council Resolutions (UNSCR) on Women, Peace and Security, the 2030 Global Agenda for Sustainable Development or the Sustainable Development Goals (SDGs), especially Goal 5 on Gender Equality, and relevant Association of Southeast Asian Nations (ASEAN) declarations and action plans.
GEWE 2019-2025 Strategic Framework	Includes (1) the expanded economic opportunities for women; (2) accelerated human capital development through investing in gender equality and women's empowerment; (3) significant reduction in gender-based violence and enhanced gender perspective in justice, security, and peace; (4) expanded opportunities for women's participation, leadership, and benefit in disaster resilience and humanitarian action; (5) expanded opportunities for women's participation, leadership, and benefit from Science, Technology, Innovation, ICT, Infrastructure, and Energy; (6) enhanced women's participation, leadership, and benefit in politics and government service; and (7) transformed social norms and culture to promote gender equality and women's empowerment. Among the over-all strategic outcomes, (1) the reduction of poverty among rural women is endeavored as a result of increased access to land and capital, access to better jobs and agribusiness opportunities, increased participation in leadership and decision making in agriculture, fishery, and forestry sectors. Included among the strategic outcomes is also (2) the improved access to available energy sources among rural households, reduced gap in the employment of women and men in the energy sector, the safe and healthy work conditions for women in the sector, and their improved representation of women as stakeholders and decision-makers in the energy development.

<sup>20</sup> [List of laws protecting women in PH | Philippine News Agency \(pna.gov.ph\)](https://pna.gov.ph/list-of-laws-protecting-women-in-ph/)

Community laws and Internal Policies of the main stakeholders	
Gender and Development plan and budget monitoring system by Department of the Interior and Local Government (DILG)	The Department of the Interior and Local Government (DILG) together with the Philippine Commission on Women (PCW), the Department of Budget and Management (DBM) and the National Economic and Development Authority (NEDA), issued the PCW-DILG-DBM-NEDA Joint Memorandum Circular (JMC) No. 2013-01 entitled “Guidelines on the localization of the Magna Carta of Women” in July 2013 was eventually superseded by the issuance of the JMC 2016-01 entitled “Amendments to the PCF-DILG-DBM-NEDA JMC No. 2013-01. The JMC provides a mechanism to ensure that gender perspectives are mainstreamed in the local government plans, programs, projects and activities. It also prescribes the necessary steps and schedules for the preparation and submission of Gender and Development plans and budget (GBP) and <b>gender and development (GAD)</b> <sup>21</sup>
Gender Toolkit for the Energy Sector by Department of Energy	The DOE GAD strategic framework is anchored in the mandates of DOE and the gender policy of the Philippine Government, which promotes the twin goals of gender equality and women's empowerment. Men and women equally contribute to and benefit from an ideal state of greater energy access for inclusive growth. The DOE aims to provide a set of guides and reference materials to its internal units, attached agencies, and other offices and organizations in the sector on how to make their operations and programs more aware of, and responsive to the gender concerns of their clients. The DOE-GAD program is implemented nationwide given the annual allocation of five percent (5%) of its budget under the General Appropriations Act since 1995. <sup>22</sup>
Community laws of Sibutu or Sitangkai	<p>The Bangsamoro Autonomous Region of Muslim Mindanao (BARMM) has its Bangsamoro Women Commission (BWC), which was created by virtue of the Bangsamoro Autonomy Act (BAA) No. 8, signed and approved on February 13, 2020. The BWC is mandated to “promote, protect and uphold women’s rights as human rights, work for the elimination of all forms of discrimination against women, ensure that legal measures are taken to promote gender justice, women’s rights and welfare, and promote gender and development including the meaningful participation of women in all levels of governance, policy and decision-making. In furtherance of the above-stated mandate, the Commission shall be the primary policy-making, coordinating and monitoring body of women, gender and development in the Bangsamoro Autonomous Region. The Bangsamoro Women Commission is also responsible for the development of women and their families by promoting and protecting their socio-economic and political rights, to attain a desired quality of life.”</p> <p>As the BWC is still new, part of their most recent activities and programs is the conduct of a series of training-workshops on the formulation of GAD, development of gender-sensitive and gender-responsive GAD agendas, GAD planning and budgeting, in order to enforce the BWC mandates stated above and enable the commission to facilitate its work. The Province of Tawi-Tawi, where the project beneficiaries of Sibutu and Sitangkai municipalities belong, endeavors to participate actively in the BWC initiatives in order to champion gender equality and mainstreaming in its predominantly islandic Muslim communities. In addition, the BWC also works closely with the Philippine Commission on Women (PCW) to ensure the alignment and harmonization of vision, mission, and goals, and the national and legal frameworks covering gender and development.</p>

### 3.1.2 Baseline Data

The Philippines has a population of approximately 108 million, with 49.8% women.<sup>23</sup> Nearly half of the population is below 15 years.

It is estimated that a total of 71,562 people would benefit directly from the project with 35,423 women and 36,139 men, and more than 150,000 people indirectly (approximately 50% women).

<sup>21</sup> [Adoption of the use of the Gender and Development Plan and Budget Monitoring System \(GAD-PBMS\) - Issuances - DILG](#)

<sup>22</sup> [Establishing a gender sensitive Energy Sector | Department of Energy Philippines \(doe.gov.ph\)](#)

<sup>23</sup> [Population, female - Philippines | Data \(worldbank.org\)](#)

In the WEF's 2022 Global Gender Gap Index, the Philippines ranked 19th out of 146 countries, this was slightly lower than in 2021, when the Philippines ranked 17th out of 156 countries.<sup>24</sup>

The Philippines has closed 78% of its overall gender gap. The country's performance is strong across three of the four dimensions of the index – education, economy, health and politics, with political empowerment being the weakest. It has closed 80% of the economic participation and opportunity gender gap, with women outnumbering men in senior and leadership roles, as well as in professional and technical professions. The country ranks 5th on the indicator assessing gender wage equality.<sup>16</sup> The Philippines has closed both its educational attainment and health and survival gender gaps. Women can expect to live in good health five years longer than men.

Although the Philippines show overall very good gender equality, this project is planned to target the Muslim communities of Sibutu and Sitangkai in the province of Tawi-Tawi, Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), Philippines, the situation for women is quite different due to extreme poverty and the Muslim gender roles and norms.

**Table 6: Key Gender Gap Data of Philippines**

Gender Gap Data of Philippines <sup>25</sup>				
1.	Overall Global Gender Gap Index	Rank	2022	19
			2010	9
		Index	2022	0.783
			2010	0.7654
2.	Global Gender Gap Political Empowerment subindex	Rank	2022	35
			2010	17
		Index	2022	0.360
			2010	0.3212
3.	Global Gender Gap Economic Participation and Opportunity Subindex	Rank	2022	16
			2010	13
		Index	2022	0.794
			2010	0.7611
4.	Global Gender Gap Educational Attainment Subindex	Rank	2022	46
			2010	1
		Index	2022	0.997
			2010	1
5.	Global Gender Gap Health and Survival Subindex	Rank	2022	30
			2010	1
		Index	2022	0.979
			2010	0.9796

**Table 7: Key Gender Baselines Figures for Philippines**

Description of the indicator	Year	Philippines
Gender Inequality Index	2019	0.43

<sup>24</sup>

[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjnn9KRmrb\\_AhWMtKQKHdvdDacQFnoECAoQAQ&url=https%3A%2F%2Fwww3.weforum.org%2Fdocs%2FWEF\\_GGGR\\_2022.pdf&usg=AOvVaw3nixralHIVnfOW72ocM9ZE](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjnn9KRmrb_AhWMtKQKHdvdDacQFnoECAoQAQ&url=https%3A%2F%2Fwww3.weforum.org%2Fdocs%2FWEF_GGGR_2022.pdf&usg=AOvVaw3nixralHIVnfOW72ocM9ZE)

<sup>25</sup> [https://tcdata360.worldbank.org/indicators/af52ebe9?country=BRA&indicator=27959&viz=line\\_chart&years=2006,2020#table-link](https://tcdata360.worldbank.org/indicators/af52ebe9?country=BRA&indicator=27959&viz=line_chart&years=2006,2020#table-link)

Gender Inequality Index	2010	0.457
Expected years of schooling (women)	2017	13.5
Expected years of schooling (men)	2017	12.8
Share of adult women (aged 25 or over) completed at least some secondary education (%)	2019	75.6
Share of adult men completed at least some secondary education (%)	2019	72.4
Education attainment, at least lower secondary, population 25+, women %(cumulative)	2017	62
Education attainment, at least lower secondary, population 25+, male %(cumulative)	2017	56.75
Educational attainment, at least Bachelor's or equivalent, population 25+, women %(cumulative)	2017	18.80
Educational attainment, at least Bachelor's or equivalent, population 25+, male %(cumulative)	2017	13.19
Educational attainment, at least Master's or equivalent, population 25+, women %(cumulative)	2017	0.535
Educational attainment, at least Master's or equivalent, population 25+, male %(cumulative)	2017	0.244
Educational attainment, Doctoral or equivalent, population 25+, women %(cumulative)	2019	0.039
Educational attainment, Doctoral or equivalent, population 25+, male %(cumulative)	2019	0.05407
Share of seats held by women in national parliament (UNDP data) (%)	2020	28
Proportion of women in ministerial positions (%)	2019	8.57
Share of women in senior and middle management (%)	2019	29
Total unemployment rate (%)	2020	2.1
Unemployment, women (% of women labor force) (modeled ILO estimate)	2020	2.44
Unemployment, male (% of male labor force) (modeled ILO estimate)	2020	1.98
Literacy rate, adult women (% of women ages 15 and above)	2015	98.24
Literacy rate, adult male (% of males ages 15 and above)	2015	98.12
Share of women graduates in STEM programmes in tertiary education (%)	2020	36.3
Share of women graduates in engineering, manufacturing and construction (% , tertiary)	2017	24.48
Share of women employment, employed in industry (%)	2020	10
Share of men employment, employed in industry (%)	2020	26
Employment in services, women (% of women employment) (modeled ILO estimate)	2020	76.98
Employment in services, male (% of male employment) (modeled ILO estimate)	2020	45.37
Wage equality between Gender	2019	81.2
Women participating in making major household purchase decisions (% of women age 15-49)	2017	89.1
A woman can travel outside her home in the same way as a man (1=yes; 0=no)	2019	1
Law mandates equal remuneration for women and men for work of equal value (1=yes; 0=no)	2019	1

The Gender Inequality Index (GII) of Philippines ranked the country 101 from a total of 162 countries in 2021. This index reflects the inequality in achievement between women and men regarding three dimensions: reproductive health, empowerment and the labour market. It ranges from 0, where women and men fare equally, to 1, where one gender

fares as poorly as possible in all measured dimensions. There has been an improvement in gender equality during the last decade in Philippines, with the GII decreasing from 0.457 in 2010 to 0.419 in 2021.

Gender Inequality Statistics of Philippines <sup>26</sup>					
	<b>Human Development Index (HDI)</b>	Value	2021	0.699	
		Rank	2021	116	
	<b>Gender Inequality Index</b>	Value	2021	0.419	
		Rank	2021	101	
		Value	2010	0.43	
		Rank	2010	64	
<b>SDG3.1</b>	<b>Maternal mortality ratio</b>	(deaths per 100,000 live births)	2017	121	
<b>SDG3.7</b>	<b>Adolescent birth rate</b>	(births per 1,000 women ages 15–19)	2015–2020	54.15	
<b>SDG5.5</b>	<b>Share of seats in parliament</b>	(% held by women)	2021	28	
<b>SDG4.4</b>	<b>Population with at least some secondary education</b>	(% ages 25 and older)	Women	2015–2019	75.59
			Male	2015–2019	72.38
	<b>Labour force participation rate</b>	(% ages 15 and older)	Women	2019	46.1
			Male	2019	73.25

### 3.1.3 Child marriage, discrimination and violence

Despite the remarkable achievements above, thousands of Filipino women suffer from **domestic violence**, economic disadvantages, discrimination at the workplace, sex and other gender related abuses. As in most countries affected by displacement brought about by armed conflict, women and children make up the great majority of the displaced population in the Philippines, and experience additional vulnerabilities. The intermittent wars affect women's livelihood, health, education and family life, among other things.<sup>17</sup>

In the targeted Muslim communities of Sibu and Sitangkai, there may be issues related to child marriage, discrimination, and violence. Due to cultural barriers, many of these issues may be left unspoken. The following are some pertinent ones.

**Community Safety.** Due to the peace and order situation in Muslim communities, safety and security is of paramount importance. Due to implementing regulations to maintain safety, peace, and order, many of the women and children are deprived of their other human rights and privileges. As a sub-section, organized violence was common during the armed conflict and tribal/clan war is also an issue in Muslim communities. It is expected that with the BARMM law, this will be minimized and controlled.

**Intimate Partner Violence.** This is a very sensitive issue among women, especially in rural areas, most often triggered by extreme poverty, lack of education and poverty. In many instances, women would deny experiencing such violence, many of them would tend to stay silent for the sake of their families. However, in-depth conversations with women (in a safe space) would surface this reluctance to elaborate and admit to intimate partner violence as this can lead to rido (clan war), by either family of the wife or husband for the abuse suffered, shame, and disgrace.

**Marriage restrictions.** Women in Muslim culture are only allowed to have one husband at a time; most of the parents prefer to have their children married to spouse(s) of the same culture or religion; divorce is usually settled at the

<sup>26</sup> <https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index#/indicies/GII>



barangay level (or tribal community level). However, men are allowed to have as many wives as possible, provided that each of his wife/family is supported adequately. Meanwhile, girls are allowed to get married before the age of 18, for a variety of reasons, such as to prevent pre-marital sex, pregnancy before marriage, economic pressures due to extreme poverty, or family traditions.

In the targeted communities there is a great need to implement existing national laws on Violence Against Women and Children (VAWC), especially within the context of cultural nuances that constrain the voices of many women and girls.

### 3.2 Who has what?

In many countries women tend to have less access to resources, such as knowledge, clean energy, technology and financial resources due to gender norms and roles.

The Global Gender Gap Index and the Gender Inequality Index indicate that women in the Philippines tend to have equal access to and control over most resources. However, in some cases and regions women and other discriminated gender groups do not have access, nor control or decision making power over community land and heritage, even though they benefit from it<sup>27</sup>.

In some areas, such as in Sibutu and Sitangkai **access to information** for women is usually understood as information from their tribal or community leaders, who are most often men. Their lack of access to information is exacerbated by poor internet and signal connections in many rural areas, access to information is even more limited.

Women on the islands Sibutu and Sitangkai also tend to face **Legal discrimination**. This refers to policies and regulations that hinder women's economic and societal participation, related to poor access to finance, employment and parliamentary representation. There are restrictions to mobility for women, which are sometimes because of discrimination and a perceived distrust of the Moro people.

On the islands Sibutu and Sitangkai there seems to be a **Son Bias**. Although, many will deny about this practice, male children are often preferred over female children with families always promoting the welfare of their sons through active involvement in societal and financial affairs. This custom exacerbates the poor participation of women in governance, employment, and even education.

#### 3.2.1 Financial (household) resources

Most women especially in rural areas fall below poverty and food thresholds in the Philippines, and do not have access to any economic or livelihood opportunities in their community. Since the workforce is dominated by men in the BARMM, women are often left behind and are not the priority in terms of getting employed.

Due to the situation in BARMM (recent armed conflict and war) and also the cultural practices and barriers, men are favored over women, they are the decision-makers, and thus have better access to information, employment, education, finance, and involvement in political and legal affairs. Thus, unless it is specified that women should, men always represent the family in any and all affairs of the family, tribe, and community. The percentage of women whose cash earnings are mainly managed by their husbands is highest in Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) (15%).<sup>28</sup>

#### 3.2.2 Literacy and Education

**Literacy** is universal, with rates above 98% for both sexes. In 2020, average expected years of schooling were 13.1 years with 13.5 years for women and 12.8 years for men. In 2017, 62.03% of adult women (25 and older) have at least completed lower secondary education compared with 56.75% of men. The percentage of Filipino women graduating from Science, Technology, Engineering, Mathematics in tertiary education was 36.3 % in 2017. Relative to male students,

---

<sup>27</sup> <https://actionagainsthunger.ph/wp-content/uploads/2021/06/2019-Gender-Analysis-Philippines.pdf>

<sup>28</sup> NDHS 2022, p. 279.

women have a higher participation rate in the elementary and secondary levels. Female students' completion rate is also higher than that of the male students' in both levels. This is because the drop-out rate for men is higher than that of women. Poor families tend to make boys work because they are considered to be more physically able than girls. Since boys generally perform poorer in school, it seems easier for parents to make them quit and get a job. Moreover, girls value education more than boys do because they no longer see themselves merely staying at home when they grow up, they expect to have careers<sup>29</sup>. However, women's barriers for secondary education include early marriage<sup>30</sup>.

Due to lack of schools (damaged by war, conflict, and insurgencies), poor road infrastructure network and prevalent poverty, most women in the BARMM are deprived of education. Most of these women do not have higher educational degrees and barely finished their high school.

In the targeted communities of Sibutu and Sitangkai, education is a primary concern. Sibutu has two (2) school districts. District I is located on the western side of the island while District II is on the opposite side. There are 12 elementary schools, six (6) junior high schools, and two (2) senior high schools. There is a low tertiary school completion rate in Sibutu reaching only 55%. This can be attributed to the fact that there is no school on the island offering tertiary education. This is exacerbated by the restrictive financial constraints that hinder some students from pursuing higher education. There is also no vocational school on the island. The Technical Education and Skills Development Authority (TESDA) conducts vocational classes on the island only once a year. The literacy rate of Sibutu is only 76% which is too low for a country with an average 99.27% literacy rate.<sup>31</sup> This can be attributed to the little to zero interest in schooling manifested by its population who faces extreme poverty. In the Socio-Economic Perception (SEP) survey conducted, only 12.6% of the surveyed household members have reached tertiary education (college level) wherein half of those (6.4%) have finished their college education. This also conforms to the trend of the tertiary school completion rate of Sibutu.

On the other hand, Sitangkai has 10 elementary schools offering complete pre- and elementary education, three (3) junior high schools, and one (1) senior high school. In the Socio-Economic Perception (SEP) survey, only 9.1% of the surveyed household members have reached tertiary education (college level) wherein half of those (4.9%) have finished their college education. Only 28.2% of the surveyed household members have reached the elementary level wherein almost one-third (9.9%) of those were graduates of elementary education. Also, only 17.6% of the surveyed household members reached the secondary level of education and only 6.7% were able to graduate from the old secondary curriculum, 2.1% were able to finish junior high school, and 1.6% finished senior high school.

In the targeted communities of Sibutu and Sitangkai, the circle of life of children and youth follows that of their parents, as there is insufficient support to enable access to better and higher education.

### 3.2.3 Access to water

Without safely managed water, sanitation and hygiene (WASH) services, women and girls are more vulnerable to abuse, attack and ill-health, affecting their ability to study, work and live in dignity. Women and girls usually have the responsibility of fetching water. This can be a dangerous, time-consuming and physically demanding task. Long journeys by foot, often more than once a day, can leave women and girls vulnerable to attack and often precludes them from school or earning an income. For women and girls, sanitation is about personal safety. Having to go to the toilet outside or sharing facilities with men and boys puts women and girls at increased risk of abuse and assault. Women and girls have specific hygiene needs. A clean, functional, lockable, gender-segregated space is needed, with access to sanitary products and disposal systems, for women and girls to manage menstrual hygiene and pregnancy. Lack of safely managed water and sanitation is an equality issue. Women and girls are disproportionately affected by poor water, sanitation and hygiene services and facilities. However, their voices and needs are often absent in the design and implementation of improvements, thereby ensuring their continued marginalization.<sup>32</sup>

---

<sup>29</sup> [philippines\\_summary\\_2008.pdf \(jica.go.jp\)](https://www.jica.go.jp/philippines_summary_2008.pdf)

<sup>30</sup> <https://actionagainsthunger.ph/wp-content/uploads/2021/06/2019-Gender-Analysis-Philippines.pdf>

<sup>31</sup> <https://www.globaldata.com/data-insights/macroeconomic/literacy-rate-in-the-philippines/>

<sup>32</sup> <https://www.unwater.org/water-facts/water-and-gender>

Globally women and girls collectively spend over [200 million hours](#) every day fetching water from far-off wells, rivers, and collection points.<sup>33</sup> This unpaid labour prevents them from participating in and contributing to the formal economy.<sup>34</sup>

Traditionally water management—the science and engineering of the resource—and water policymaking have been male-dominated spaces, much like other fields of governance. The role of women within water decision-making spheres, both at the domestic level and even more so at the international, transboundary space, has been unrecognized and overlooked. Domestic water management, which is more focused on supply management through infrastructure development, is a very top-down political process and is managed through patriarchal structures highly dominated by men on the political as well as technical sides. A [World Bank study of 28 economies](#)<sup>35</sup> showed that fewer than one in five workers in the water utility sector were women. This imbalance often results in water management, distribution, and access processes which are oft-times fundamentally ignorant to the needs of women and young girls.



Investment in water systems in small island communities can provide multiple socioeconomic benefits. The provision of clean water to households facilitates improvement in health and sanitation, reduction of poverty, improvement in food production safety, and support of sustainable development.

Enhanced access of women to clean water can increase their livelihood opportunities

- Women have the responsibility to collect water that is used for cooking, drinking and personal hygiene; they travel long distances (time poverty) → an investment in water systems can free up women's time
- water for livelihood: Women and children need water for daily chores, e.g. cooking, hygiene of elderly, children and sick, personal hygiene during pregnancy and menstruation → access to clean water can improve health of women, children and elderly
- Women do not play a role in decision making in water → women's involvement in water decision making can make water system more inclusive
- Due to their role women are more impacted by climate change (water scarcity caused by climate change, extreme weather events, etc.) → water systems can make women more resilient to climate change

---

<sup>33</sup> [Women And Water - A Woman's Crisis](https://water.org/our-impact/water-crisis/womens-crisis/), <https://water.org/our-impact/water-crisis/womens-crisis/>

<sup>34</sup> <https://www.stimson.org/2022/the-women-water-and-policy-nexus/>

<sup>35</sup> <https://openknowledge.worldbank.org/bitstream/handle/10986/32319/140993sum.pdf?sequence=5&isAllowed=y>



Women and girls usually gather and chop wood for firewood (fuel) used in cooking. They normally live in stilt houses made of light materials.

Several remote communities such as Sibutu and Sitangkai still suffer from unclean water and inadequate sanitation, hindering the community's sustainable development. With the proposed integrated water resource management (IWRM) system, these remote off-grid island communities will be able to access clean water that is safe to use for drinking and other household domestic activities. Improved water supply in these communities is seen to improve women's and children's health, enhance their economic growth, and boost productivity in different sectors. Currently, women and children in Sibutu spend per day about 30 minutes to 1 hour to fetch 1 (20-Liter) container of drinking water, while in Sitangkai, it takes about twice to 3 times as long, so approximately 90 minutes to 3 hours per day due to potable water scarcity. In some instances, people use untreated rainwater or brackish water for drinking and cooking, which leads to poor health and well-being. Acute watery diarrhea is still the top disease-causing morbidity in the region due to scarcity of clean potable water.



Rudimentary rainwater harvesting system for household use like laundry and cleaning.

When water is supplied ideally at Level III to the households, time spent to fetch water is reduced, thereby increasing time spent on more productive activities. Improved water access through the IWRM system can also support reduction in poverty, reduction of marginalization in communities, and increased economic opportunities for various sectors.

This, in turn, improves both social and economic development in these communities. However, the overall investment in improved water supply and sanitation systems are considerable, especially for poor communities on the two islands.

The willingness to pay among community stakeholders as well as their acceptance must be carefully considered and established. Moreover, feasibility of such endeavors can be met with full government support and sustainability can be achieved through private sector and local government partnerships.

The establishment of an integrated water resource management (IWRM) in Sibutu and Sitangkai can open opportunities for gender equality, women's empowerment and youth involvement as identified by the Water Study for this project (see Annex of the project document).

### 3.2.4 Access to Energy and employment in the energy sector

Access to energy, alongside access to clean water and food is the basis for human well-being and livelihoods, economic activities and sustainable development. Energy is a fundamental component in all subsistence, productive and leisure activities. The quality and quantity of available energy determines the quality of life of the users in addition to the effectiveness and efficiency of activities. The same energy service may in fact affect men and women in varied ways, with different economic and social results. It is not only the gender division of labour which results in different energy needs, but there are also different perceptions of the benefits of energy and the capacities to access those benefits based on gender. Hence, interventions that are connected to sustainable energy are needed to address gender equality.

In the targeted communities Sibutu and Sitangkai the electricity needs of both island municipalities are supplied by diesel-fired power plants (DPP) owned and operated by the NPC-SPUG<sup>36</sup> for 24 hours a day. Electricity distribution in both islands is managed by the Tawi-Tawi Electric Cooperative (TAWELCO).

Sibutu Island is currently served by two (2) NPC-SPUG diesel-fired power plants. Serving eight barangays, Sibutu's DPP in Barangay Datu Amilhamja Jaafar has an installed capacity of 0.786 MW and a dependable capacity of 0.590 MW. Serving another eight (8) barangays, the Tandubanak DPP in Barangay Taungoh has an installed capacity of 1.045 MW and a dependable capacity of 0.800 MW.

Meanwhile, Sitangkai's DPP has an installed capacity of 2.109 MW and a dependable capacity of 1.110 MW.

A previous project implemented by UNIDO has recently installed a 0.650 MW solar PV-diesel hybrid system in Taungoh, Sibutu and a 1.0 MW solar PV-diesel hybrid system in Tongmageng, Sitangkai. These two hybrid systems are expected to serve the islands' electricity needs in 2023. The locations of the existing diesel-fired power plants and solar PV-diesel genset hybrid systems of both islands are considered favorably for utilizing excess energy to support clean water provision, and in this way addressing the pertinent energy-water nexus issues.

### 3.2.5 Climate change

Women often face higher risks and greater burdens from the impacts of climate change in situations of poverty and due to existing roles, responsibilities and cultural norms. For example, in Sibutu and Sitangkai, women are responsible for household energy, food, water and care for the young and elderly. Climate change amplifies existing gender inequalities and poses unique threats to women's and girls' livelihoods, health, and safety since during droughts women have to travel further to collect water, they have to work harder to secure income and resources for their families. This puts added pressure on children, often girls, who often have to leave school to help their mothers manage the increased burden.

Climate change (such as sea level rise, extreme weather events such as droughts and storms, heatwaves, increased sea surface temperature) has a strong impact on agricultural production systems and the availability of water. These include:

- low productivity of seaweeds → decreased income → limited livelihood opportunities, kids drop out of school to help increase family income
- decreased availability of water → impact of nutrition and health, women need more time to collect water, girls drop out of school to help mothers collect water → deteriorated livelihood opportunities, reduced life expectancy

---

<sup>36</sup> National Power Corporation-Small Power Utilities Group



Rural communities are in the front lines in the battle to improve food security. At the same time, these communities must also cope with changing climate conditions. Gender is one critical dimension of this diversity. It shapes men's and women's roles and opportunities, and consequently determines their access to and control over the resources and processes needed for dealing with climate change. Accurate climate information and the ability to interpret it allows farmers to plan and make better decisions on how to adapt to climate change. Due to the gendered division of labour and gender-based power structures, women

- tend to be more vulnerable to climate change
- usually have lower access to production inputs, resources and information
- are not involved in decision making, rendering the adaptation efforts gender blind
- sometimes cannot diversify their income resources due to traditional gender norms and roles

This often makes women more vulnerable in times of crisis and climate change.

### 3.3 Who does what?

Despite the great efforts of the Philippines to promote decent work and gender equality both in law and practice, there still remain some challenges that the country faces. The labor force participation rate of women remains lower than that of men which could be attributed to the prevalence of gender-based discrimination at the workplace particularly discrimination in hiring, retention and advancement of women workers, sexual harassment, wage gap and limited flexible work arrangement, among others. Moreover, the issue on unpaid care and the concentration of domestic and care work to women compound on the multiple burden which limits on their full participation in the labor market<sup>37</sup>. The limited and unequal participation of women in economic opportunity has a direct impact on the country's economic growth and development. The labor force participation rate of women is about 47% while men is approximately 73% — which is 26% lower than that of men in 2020.

Approximately, 10% of working women are **employed** in the industry sector. The Philippines is the only country in the world where women have parity to men in senior management roles.<sup>22</sup>



There is a strong gendered division of domestic labor with women having primary responsibility for household and care work and a higher total work burden relative to men. In the Philippines, women provide 84% of the total household time

---

<sup>37</sup> [Labor and Employment | Philippine Commission on Women \(pcw.gov.ph\)](https://pcw.gov.ph)

allocated to child care.<sup>38</sup> Gendered social norms contribute to women having greater responsibility for, and time commitments to, domestic and unpaid care work, and this has been slow to change despite women's increased participation in, and time allocated to, paid work. Relatively high fertility rates continue to raise the demand for women's unpaid labor, especially given the low provision of child care services<sup>39</sup>. One major indicator of decent work is the level of remuneration. Low-wage work is generally indicative of a lack of decent work and is more prevalent among women. Over the past decade, the average daily basic pay, in real terms, has declined for both women and men in the Philippines. Among employees, the gender wage gap based upon the daily wage rate shows a slight wage advantage for women in the Philippines. However, once human capital gender differences are taken into account, the gender wage gap is between 23% and 30%, demonstrative of the high level of gender inequality in the labor market.<sup>21</sup>

In the targeted Muslim communities of Sibutu and Sitangkai, as in the case of BARMM in general, the roles of women are somewhat skewed. Due to some cultural practices and barriers, many of the prevalent gender issues are kept unspoken but still observed in many of its communities. Glimpses and images of gender issues are clearly illustrated where energy-water access is concerned. Women may find themselves paid for work and have for themselves some work, and this is now slowly becoming acceptable, especially when women have good education; however, as in cultural norms, staying at home is viewed as not discriminatory with many of the women agreeing that it is a woman's job to look after the family and manage home and family, and the men's role is to earn money for the family.



Women and girls sell goods at home to augment family income.

Strong family culture promotes this concept and thus, women may be constrained or not have the freedom to exercise and make decisions for themselves. As a consequence of this strong family culture, the concern is about women's conviction on their 'subservient' role to their husbands which tends to reinforce male-domination at the household level and in terms of the political affairs of the community and the region is general. **Consequently**, women are in charge of ensuring there is enough food and water in the household. It is their duty to fetch water for household use, and this is very difficult, when water is not available nearby, as in the cases of Sibutu and Sitangkai communities. The same goes for food, especially when the husband's income is insufficient (which is often the case) to support the basic needs of the family. Another consequence related to extreme poverty (lack of access to finance, employment, basic needs) is that children are now involved in earning income to support the family, getting enough money to support covering basic needs (water, fuel/firewood, agri-and sea-products for food) and no more time to focus on their education.<sup>40</sup>

---

<sup>38</sup> [Asia Still Lacks Decent Jobs for Women | Asian Development Bank \(adb.org\)](#)

<sup>39</sup> [Gender Equality in the Labor Market in the Philippines | Asian Development Bank \(adb.org\)](#)

<sup>40</sup> Mahinay, A.C., Tato, S.A., Traje, A., Romo, G.D.A., Sarmiento, J.M.P. 2022. Women in BARMM: Towards Normalisation of Major MILF Camps in Mindanao, Philippines. VSO Philippines, 54 pp.

In BARMM communities, where the Muslim culture is predominant, women lack the access to employment, finance, and economic productivity. In seaweed farming, it is often the men who grow/farm the seaweeds, while women and children do the supporting roles in the process, e.g. preparing the ties for seaweed seedlings, post-harvest operations such as drying, segregation, and cleaning. Seaweed farming is most often a family affair, where all members of the household are involved, while the men/sons/brothers focus on the actual seaweed farming and harvesting, and also often fishing and gleaning, spending their working hours at sea.

In a typical family, men find work and earn money (e.g. seaweed farming, fishing). Women always have the supporting roles, in addition to the management of family and household, which include ensuring the adequate supply of food, water, energy (fuel/firewood), and other family needs.

**Agriculture** is one of the largest sectors of women's employment in the Philippines and is identified as a priority for development and export, with food security being an important goal. Despite ongoing agrarian reform, when compared with men, women own less land in their own name than men and are disadvantaged through inheritance laws and land titling systems and in their ability to purchase land. Women are more likely than men to be responsible for subsistence crops and to lack access to cash crops and the resulting income. Furthermore, women receive less agriculture extension training and less credit.<sup>21</sup> The industry sector accounts for only about 10% of women's employment, indicative of the challenges in promoting productive and decent work for women.

In the Philippines, from 2000 to 2011, there was a shift in women's employment out of both the agriculture and industry sectors and into services. Specifically, among women, the share of total employment in agriculture fell from 23.9% to 21.7%; the share of total employment in industry fell from 13.3% to 10%; and the share in services rose from 62.8% to 68.3%. Among men, the employment share in industry remained stable, at about 18% over this period. The declining share of women's employment in the industry sector suggests a deteriorating environment for decent work for women.<sup>21</sup> The overarching manufacturing policies are essentially gender blind, and the government appears to be crafting an integrated manufacturing plan to increase growth and diversification. Such a plan is needed to ensure identification of subsectors and products that can enhance women's employment and that also make provisions to include rural women.

The services sector is large and heterogeneous in productivity, incomes, and decent work. The wholesale and retail trade and services (WRTS) sector accounts for a large share of women's employment in the Philippines and typically comprises self-employed workers and microenterprises that sell food and household goods. Women are overrepresented, accounting for approximately 60% of all WRTS workers in the country. Public or government-related employment typically offers more opportunities for decent work and social protection than private sector employment. For example, in the Philippines, a relatively high-skilled occupation related to the public sector—officials of government and special-interest organizations, corporate executives, managers, and supervisors—has an average wage of 2.4 times the average wage for women. In addition, public sector employees are more likely than employees in the private sector to have access to social insurance, particularly pensions. There are opportunities for expanded employment and decent work in the public sector for women, given that women's share of employment in the public administration sector is only 40%. Furthermore, while women have some access to public sector employment, they may still experience a glass ceiling and wage discrimination, given their levels of education, experience, and ability.

Businesses tend to be small in size in the Philippines, where, in 2011, 91% of all enterprises were microenterprises employing fewer than 10 people (Department of Trade and Industry Micro, Small and Medium Enterprises). Although all owners of micro- and small enterprises experience a variety of challenges, women entrepreneurs face additional constraints. In the Philippines, women owned 55% of newly registered businesses in 2010. However, it is more common not to register businesses and thus sex-disaggregated data on these unregistered businesses are limited. One estimate indicates that women own 34% of unregistered enterprises, but this estimate may be low because informal enterprises include agriculture households, which are more likely to be counted as being owned by men. Among new businesses registered by women, 51% engage in retail activities, 41% engage in service, and only 5.5% engage in manufacturing (GTZ 2010, 45-46 and Table 7). Constraints faced by women entrepreneurs in the Philippines include limited access to capital and credit, due to lack of collateral; limited access to value-enhancing inputs such as business development

services, technology, and training; lack of information; high transaction costs on business development services and credit; and domestic and care responsibilities, which restrict the time available to operate an enterprise (PCW 2012).

Analysis of gender inequality in the labor market must take account of gendered constraints arising from informal and formal norms, beliefs, regulations, and laws<sup>41</sup>. For example, due to social norms, beliefs, and values within family and kinship systems, women have more limited resources in the form of assets, time, and social contacts. In addition, women’s greater responsibility for unpaid domestic and care work affects their ability to engage in paid work on the same terms as men. This may be explained by the patriarchal system in the Philippines, where men are traditionally believed to be the main breadwinners while women are responsible for childbearing. In the Philippines, women are still strongly tied to their traditional roles as mother, wife, and housekeeper.

Women in impoverished, rural areas of the Philippines have limited educational opportunities and they experience greater gendered stereotypes that prevent them from engaging in natural resource management. Women, especially in the Mindanao province, have very limited exposure to decision-making processes. There is a preference to send sons rather than daughters to school, restricting daughters’ ability to pursue a living outside the informal economy and receive education.<sup>42</sup>

### 3.3.1 Water

In the targeted communities Sibutu and Sitangkai women are responsible for all household chores and are primarily responsible for finding resources needed for their family to survive. Fetching water is one of these chores. According to statements during a consultative meeting, men are not allowed to fetch water, only women and children. Therefore, women are disproportionately affected by water scarcity or by unclean water sources.

Since women and children (specifically girls) bear the primary responsibility of collecting water, a more efficient water supply system that could ideally provide level III access to water supply could reduce time spent for collecting water, which typically inhibits women and children from making more productive use of their time.

Table 8 provides a summary of the anticipated impacts of the proposed water supply systems in the two municipalities to women and youth.

**Table 8: Anticipated Impact to Women and Youth**

Key Indicator	Impact to Women	Impact to Youth
<b>Economic</b>	<ul style="list-style-type: none"> <li>- Equal opportunities to be directly or indirectly employed in the IWRM</li> <li>- Time spent to collect water will be redirected to other productive activities such as seaweed farming and engaging in small business, handicrafts and cottage industries adding to their household income</li> <li>- Increased freedom to access and control funds and manage their own personal affairs</li> </ul>	<ul style="list-style-type: none"> <li>- Opportunities to be directly or indirectly employed in the IRM</li> <li>- With employment, increased access and control to funds which supports financial freedom</li> <li>- Increased time for education also translates to increased economic opportunities</li> </ul>
<b>Technical</b>	<ul style="list-style-type: none"> <li>- Improved technical capabilities, thereby increasing employability</li> </ul>	<ul style="list-style-type: none"> <li>- Improved technical capabilities, thereby increasing employability</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>- Reduced poverty</li> <li>- Improved health, sanitation, and hygiene for women, specifically, and for the family and community, generally</li> </ul>	<ul style="list-style-type: none"> <li>- Time spent to collect water can be redirected to increased time in education or in participation in youth activities within the community</li> </ul>

<sup>41</sup> For structures of gender constraints, see Kabeer (2008). For empirical support for a negative relationship between inequalities and social institutions and women’s LFPR, see Jutting et al. (2008).

<sup>42</sup> [Women in environmental decision making : case studies in Ecuador, Liberia, and the Philippines | IUCN](#)

- |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>- Reduction in water-borne diseases and improved safety in cooking</li> <li>- Increased time to care for their families</li> <li>- Increased time to be involved in social and cultural affairs of the community</li> <li>- Improving emancipation from gender inequalities and discrimination</li> </ul> | <ul style="list-style-type: none"> <li>- Improved sanitation and hygiene practices</li> <li>- Reduced inequality for children, especially girls</li> </ul> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 3.3.2 Seaweed

In the targeted communities Sibutu and Sitangkai seaweed farming was commonly reported to be a family affair.

Seaweed farming is a family enterprise with family members, both immediate and extended, helping out during the pre-farming preparation, farming, harvesting, and drying. Children, including those of their neighbors, help, which makes them miss school.

Women are involved in all stages of the cropping cycle and post-harvest processing—from prepping and tying the seedlings to the lines in the farm, setting up the lines, to maintaining the growing seaweeds, drying, and packing. In addition, women also sell fresh seaweeds in the markets.

	
<p>A typical woman or girl’s chore, helping in the preparation of seaweed seedlings tied with plastic straw (blue ties) or in untying the harvested seaweeds from its rope.</p>	<p>Drying seaweeds on bamboo floors, at the front yards of stilt houses. Women and children usually take care of drying and harvesting these raw seaweeds, and ensuring they are not wet again when it suddenly rains.</p>



	
<p>Some girls helping in preparing plastic ties and floaters (empty plastic bottles) to be used for hanging seaweed seedlings.</p>	<p>Hanging and drying harvested seaweeds, typical chores of women and children at home.</p>

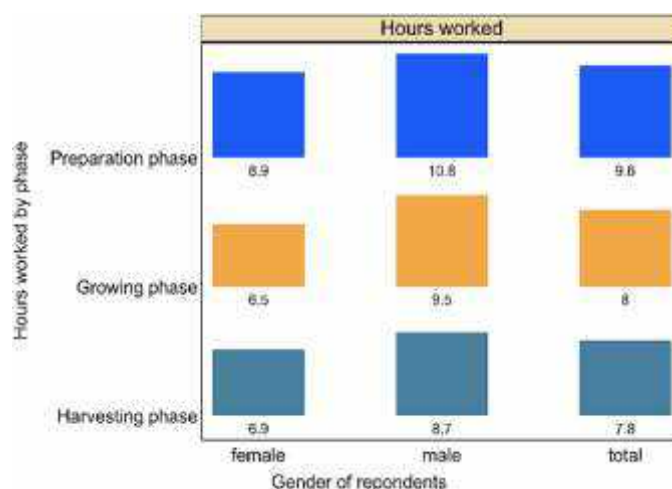
Currently no data is available that is needed for the baseline, and it is recommended to collect gender and age disaggregated information for the following indicators:

- Farm owners: male, female
- Employees per farm
  - o Most farm owners seem to rely only on informal family labour, indicating that seaweed farming is a family venture.
  - o Another study for an island in Philippines indicated that the average number of women engaged in seaweed production tends to be higher compared to the average number of men, either in farms which rely entirely on family labour or in farms which do not solely rely on family workers. A reason might be that employment in aquaculture, and in particular female employment, tends to be informal (ILO, 2021; Kruijssen et al., 2018; Elson, 1999).
- Salary of women, men
  - However, women farmers **are not compensated** for their contribution to the farm because their labor inputs are not considered as part of the capital investment. In addition, women farmers are not considered important players of the industry because of their limited knowledge, lack of skills, training and lower level of education compared to their male counterparts. They learned to farm through their own initiative and hands-on activities. The male farmers attribute their success in farming to the skills and experience gained from farming for a long time. Skilled and experienced farmers were more likely able to address problems such as ice-ice infection, epiphyte infestation or extreme weather conditions. It is important to note that a good education would improve the capacity of seaweed farmers to think critically and manage their farms effectively.
  - o Another study for similar islands in Philippines<sup>43</sup>, data showed that female workers were always and significantly paid less than male workers both in those seaweed farm operations relying solely on family contributions and in farms with owners also employing workforce outside the family circle. In case of family-only supplied labour men earned 45.4% more than women, while in case of salaried work in seaweed farms which used family as well as non-family inputs men were paid 66.7% more than women.

<sup>43</sup> <https://www.sciencedirect.com/science/article/pii/S0743016723000918>

- The findings from another study for similar islands in Philippines<sup>44</sup> show that female participation in seaweed production is considerable, but women and men do not receive equal remuneration; women earn less than men on average irrespective of working in a family business context or working outside a family-owned business. This suggests that women contribution is overlooked and that gender power relations are unbalanced in the context of seaweed farming activities. Power dynamics, at work and in the household, are not solely shaped by economic returns; there are other interconnected factors at play (i.e. access to or control over productive resources and/or personal decisions, different occupations, social context, geographic locations, cultural norms, etc.) (Kruijssen et al., 2018; Richardson, 2018) which may prevent women from benefiting equitably from their participation in seaweed production.

The study showed that women tend to work less hours overall compared to men in the graphic indicting the gendered division of labour - it needs to be analyzed if these findings also apply for Sibutu and Sitangkai:<sup>45</sup>



In another recent study,<sup>46</sup> it is reported that the majority of seaweed farmers preferred to sell dried seaweeds as it was among the primary requirements of the traders in the villages and more than half (67%) of the women seaweed farmers chose this option. Further, the women seaweed farmers of Tawi-Tawi solely learned the seaweed farming techniques through observation and involvement in the different seaweed farming activities conducted by their parents or husbands. While the households served as the primary training ground for seaweed farming among the women, the men had relatively more sources of information and had participated in trainings conducted by the government and NGOs. In this study, the overall results show that men seaweed farmers were provided with more options for sources of information and skills on seaweed farming than women. It is noted further that no women in Tawi-Tawi or Zamboanga City (city near Tawi-Tawi) participated in any formal trainings on seaweed farming.

In terms of resources, the study reported that women in Tawi-Tawi always ask funds from family members (e.g. husbands) in procuring farming materials for seaweeds such as soft ties, floaters, and ropes, while in other areas like Bohol (Central Visayas), women can supplement their budget by availing of credit provided by village traders and other micro-credit facilities.

The study notes that gender relations in the seaweed farm sites were dictated by the economic needs, ensuring steady income for the family, however, traditions still influence the farmers' perceptions in what activities men and women can participate. As an example, the primary consideration for the distribution of responsibilities in seaweed farming is

<sup>44</sup> <https://www.sciencedirect.com/science/article/pii/S0743016723000918>

<sup>45</sup> <https://www.sciencedirect.com/science/article/pii/S0743016723000918>

<sup>46</sup> Suyo JGB, Masson VL, Shaxson L, Lhan MRJ, Hurtado AQ, 2020. A social network analysis of the Philippine seaweed farming industry: unravelling the web. Marine Policy 118 (2020) 104007.

physical strength. Women are mostly associated to activities which are less physically straining, e.g. seedling preparation, while farm construction and management in the sea are associated with men.

Gender as a constraining factor was likewise observed in terms of knowledge of seaweed market, organizational membership for access to resources, and access to technology, trainings and material/financial resources. Mostly, men in Tawi-Tawi are relatively better off compared to women in these terms, since men are regarded as the heads of the family, and thus, the decision-makers in the seaweed farming business.

In the study of gender-inclusive value chains in the case of seaweed farming,<sup>47</sup> results show that “though men are very visible in the different nodes of the chain, women have significant involvement in production, post-harvest, and in marketing segments. Although women are not directly paid for their efforts considering that seaweed farming is generally a family venture, they contribute a considerable share to the family income. Further, results revealed that technical assistance to the farmers was a potential strategy to enhance the participation and gains of the husband-farmers, together with the wives/women involved in seaweed production. Having these gender-specific results highlights the importance of integrating gender in the value chain research and initiatives.”

### 3.4 Who decides?

The 1987 Constitution of the Philippines paved the way for the Women in Development and Nation Building Act and the Magna Carta of Women, which was signed into law in 2009. These promote women’s participation and representation in political and other decision-making bodies and processes, recognize gender mainstreaming (or integrating gender equality and women’s concerns) in government as an implementation strategy, and provide the basis for the inclusion of a **gender and development (GAD)** budget in the national budget law, which began with the 1995 General Appropriations Act.<sup>48</sup> The Philippines appears to be the strongest performer from a policy standpoint; having been a leader, especially within Southeast Asia, for enacting gender-sensitive policies and other policies pertaining to women’s rights since the late 1980s.

As early as 1937, Filipino women were already allowed to vote and stand for election. Further, as early as 1941, a woman had already been elected into Parliament (the first in the region). The Philippines takes pride in having numerous Filipino women who played significant roles in the United Nations to advance women’s global agenda. Filipino women already occupied high positions in the U.N. Commission on the Status of Women in 1964. They have also sat as Commission on the Elimination of All Forms of Discrimination Against Women (CEDAW) Committee Chair and Experts. There are more women employees than males in the Philippine government bureaucracy. However, Filipino men dominate as decision makers and managers while women are predominant professionals in government. The Philippines had two women Presidents. While the incumbent President is a woman, the percentage of elective positions occupied by women is less than a fifth of the total number of positions.<sup>17</sup>

Nevertheless, according to the World Economic Forum’s Global Gender Gap Report of 2022, the **political empowerment gap has widened** considerably over the past years until 2020 and remained dropped to 35th position in 2022. This downgrade is almost entirely attributable to lower women representation in the cabinet, which declined from 25% to 10% (8.57%) between 2017 and 2019. Women representation in the parliament was also slightly down and stood at 28% at the beginning of 2019.<sup>49</sup> According to the Gender Equality and Women Empowerment Plan of the Philippine Commission of Women<sup>50</sup>, there remains a huge gender gap in women’s political participation. Women face a challenging environment for political participation and there is prevalence of VAW in public and political life. The proportion of occupied elective positions shows higher than 50% gender gap at 23.1% or 4,180 women and 76.9% or 13,888 men. Women as public leaders have been active and visible but have been consistently politically attacked, as well as targeted by sexism and misogyny. There is a need for heightened protection of women and girls from gender-based violence,

---

<sup>47</sup> Ramirez PJB, Narvaez TA, Santos-Ramirez EJS, 2020. Gender-inclusive value chains: the case of seaweed farming in Zamboanga Peninsula, Philippines. *Gender, Technology and Development*. <https://doi.org/10.1080/09718524.2020.1728810>

<sup>48</sup> DOE Toolkit for the Energy Sector

<sup>49</sup> <https://www.weforum.org/reports/gender-gap-2020-report-100-years-pay-equality/>

<sup>50</sup> <https://library.pcw.gov.ph/wp-content/uploads/2022/07/PCW-Updated-Gender-Equality-and-Womens-Empowerment-Plan-2019-2025-2022.pdf>

including the newly emerging online sexual bullying, harassment, and exploitation. Related to this is the alarming decrease in reporting of gender-based violence (GBV) and documented accounts of breakdown of referral mechanisms.

However, in natural resource management, in many areas of the Philippines, gender quotas and women's engagement appear to be strong on paper, but there are inconsistencies in some areas/sectors in upholding those policies and gender quotas for women's participation.<sup>23</sup> Women's involvement in community level processes regarding the environment varies by region. In some areas, women and girls have very limited exposure to decision-making processes, women and girls are less educated, and stronger patriarchal roles prevent women from engaging in resource management discussions.

It appears that women in the Philippine national government are also not taking on top positions. Only 20% of Philippine ministers of environment are women and only 36% vice ministers of environment are women.<sup>23</sup> It is possible that women in government may be better represented at lower levels of governance (as directors, division chiefs, etc.) and suggest that women in the Philippines are experiencing the "glass ceiling effect", whereby women struggle to advance their careers and achieve top position due to gendered barriers in the workforce.

However, women's involvement in civil society and particularly international environmental delegations is strong. While women's representation as NGO presidents/executive director was only about 33%, women constituted roughly half (47%) of board members. Government delegates for UNFCCC COP19 were 67% women and 71% women for UNCBD COP11.<sup>23</sup> With the exception of UNCCD COP11, women's strong performance in international environmental delegations could be a result of the Philippines' gender-responsive development policies.

Since 1989, to strengthen women's voice and influence in natural resource management and policy, the Department of Environment and Natural Resources (DENR) has initiated several mechanisms, including the creation of the Technical Working Committee on Women (TWCW) to serve as DENR's Women in Development Focal Point (PCW, 2009). The TWCW's function was to ensure that DENR policies, programmes and projects met the needs and interests of the women they served, as well as the interests of their women employees. The Philippine Strategy for Sustainable Development (PPGD) also set specific objectives, "to ensure the full participation in and benefit by women from sustainable development," (PCW, 2009). These objectives include gender mainstreaming and the promotion of women in decision making (PCW, 2009). However, despite the Philippines' policy advances, women still face certain obstacles, notably a male-dominant culture, which women experience to varying degrees across different areas of the Philippines and socioeconomic status. In the higher socioeconomic bracket, it is more difficult for women to obtain high-level environmental decision-making positions. For example, women can occupy high-level positions in the environmental sector but they must have the academic degree (master's degree or Ph.D. with experience), while men occupy these positions without the same academic credentials and are hired solely based on their experience..

In the targeted communities Sibutu and Sitangkai tend to have no parliamentary representation. Most women do not hold any important positions in their villages to have the chance to lead, more so in bigger communities of the political and governance system. Most of the time, the elders, tribal and community leaders are men. When there are women holding positions, they are often regarded as the representatives of their father or husband or brother.

Findings from a study for a similar islands in Philippines<sup>51</sup> showed that women were less likely than men to make decisions regarding **seaweed aquaculture** production, from preparation to materials to buy (e.g., tools, equipment, raw materials) as well as how to use seaweed farming income. However, women were more likely to have greater influence over household decisions than men.

---

<sup>51</sup> <https://www.sciencedirect.com/science/article/pii/S0743016723000918>

## 3.5 Who benefits?

### 3.5.1 Stakeholder assessment

A guiding principle of the project is to ensure that both women and men can equally lead, participate in and benefit from the project (UNIDO Gender Policy 2019) and to comply with relevant laws and regulations. Therefore, it is important to analyze the stakeholders involved.

The project will target:

- End users, including women and men in the targeted communities in Sibutu and Sitangkai who utilize water and who are involved in the seaweed value chain
- Policy makers and decision maker involved in policies and decisions at the national and local level (local government units - LGUs)
- NGOs and CSOs promoting gender equality and the empowerment of women
- Academia and other educational/research institutions, which can provide appropriate knowledge and information, trainings and workshops, and further advice
- Business and industry, which can provide further investments and access to finance, to further develop economic productivity, with the adequate supply of clean energy and potable water

Special efforts will be made to promote equal participation of women and men, both at managerial and technical levels, as consultants, participants, entrepreneurs, mentors, etc. in all stages of project implementation.

The stakeholder assessment in the Philippines took place during the Project Preparation phase in forms of bilateral meetings with several national stakeholders. The discussions and a desk review led to identification of some organizations, initiatives and associations that promote GEEW. This will potentially support the implementation of the project in terms of gender responsive outreach, networking, mentoring, and strengthening gender-responsiveness of national institutions relevant for policy development. Relevant stakeholders are summarized in the following table. The possible scope for collaboration with those organizations is also indicated tentatively and will be confirmed through stakeholder consultations.

Moreover, it is important to assess the capacity of the project stakeholders to execute the gender mainstreaming strategy of the project, since their capacity could affect compliance with the Gender Mainstreaming Strategy and Action Plan. This will be done during project inception. The activities could include the following:

- enhancing their awareness on women's role in the seaweed value chain
- building their capacity to mainstream gender into their work
- appointing an ESP compliance and gender focal point
- sharing guidelines for execution entities to comply and to ensure 'opportunities' are identified and exploited.



**Table 9: Stakeholder**

ORGANISATION	Description	Potential scope of Cooperation									
		Location	Website	Energy-gender expertise	Energy-water expertise	Access to gender experts	Access to women leaders /speakers	Support for Events and outreach	Mentoring for women	Project execution support	Training / Gender Sensitization
International Network on Gender and Sustainable Energy (ENERGIA)		Netherlands but Active in Asia and Africa	<a href="https://www.energia.org/">https://www.energia.org/</a>	x		x	x	x		x	x
Women in Renewable Energy (WIRE)		Worldwide	<a href="https://www.womenrenewableenergy.ca/connect">https://www.womenrenewableenergy.ca/connect</a>	x			x		x		
Women in Renewables Asia (WiRA)		Shanghai	<a href="https://www.womenrenewables.org/about-us">https://www.womenrenewables.org/about-us</a>	x				x	x		x
Global Women's Network for the Energy Transition (GWNET)		Worldwide	<a href="https://www.globalwomenent.org/">https://www.globalwomenent.org/</a>	x		x	x	x	x	x	x
Women in Cleantech and Sustainability (WICS)		USA	<a href="https://www.womeninleantechandsustainability.org/">https://www.womeninleantechandsustainability.org/</a>	x			x				
National Economic and Development Authority		Philippines	<a href="https://www.neda.gov.ph/">https://www.neda.gov.ph/</a>							x	
Gender Focal Point of MINDA	- Executing entity	Philippines								x	

Gender Assessment and Draft Gender Action Plan

	<ul style="list-style-type: none"> <li>- Chair of the Project Steering Committee</li> <li>- Partial execution of component 2 of the project (2.1.4 – knowledge dissemination in the region)</li> <li>- Partial execution of component 4 of the project (4.1.2 – knowledge management and dissemination)</li> <li>- Partial execution of component 5 of the project (Activity 5.1.1 – consultation)</li> </ul>										
Gender Focal Point of BARMM Government (MILG, MENRE, MAFAR)	<ul style="list-style-type: none"> <li>- Potential co-executing partner for project activities (components 1 – 5),</li> <li>- Support in capacity building activities and knowledge dissemination.</li> </ul>	Philippines									x
Gender Focal Point of the Local Government of Sitangkai	<ul style="list-style-type: none"> <li>- Provision of land for the desalination system and PV system extension</li> <li>- Support in organizing civil works (building of desalination plant, PV system extension and water distribution system)</li> <li>- Support in capacity building activities</li> <li>- Setting up water districts and water management board.</li> </ul>	Philippines									x
Gender Focal Point of the Local Government of Sibutu	<ul style="list-style-type: none"> <li>- Provision of land for the desalination system and PV system extension</li> <li>- Support in organizing civil works (upgrading of the water distribution system)</li> <li>- Support in capacity building activities</li> <li>- Setting up water districts and water management board.</li> </ul>	Philippines									x
Gender Focal Point of the Provincial Government of Tawi-Tawi	<ul style="list-style-type: none"> <li>- Support in capacity building activities and knowledge dissemination</li> </ul>	Philippines									x

Gender Assessment and Draft Gender Action Plan

	- Supporting role in setting up water districts and water management board.										
Department of Social Welfare and Development		Philippines	<a href="https://www.dswd.gov.ph/">https://www.dswd.gov.ph/</a>					x			
Department of Trade and Industry		Philippines	<a href="https://www.dti.gov.ph/">https://www.dti.gov.ph/</a>								x
Technical Education and Skill Development Authority		Philippines	<a href="https://www.tesda.gov.ph/">https://www.tesda.gov.ph/</a>						x		x
National Electrification Administration		Philippines	<a href="https://www.nea.gov.ph/ao39/">https://www.nea.gov.ph/ao39/</a>								x
Department of Energy - Gender and Development		Philippines	<a href="https://www.doe.gov.ph/">https://www.doe.gov.ph/</a>	x		x	x	x	x	x	x
Philippine Commission on Women		Philippines	<a href="https://pcw.gov.ph/">https://pcw.gov.ph/</a>	x	x	x	x	x	x	x	x
UN Women Philippines		Philippines	<a href="https://asiapacific.unwomen.org/en/countries/philippines">https://asiapacific.unwomen.org/en/countries/philippines</a>	x	x	x	x	x		x	x
Women's Business Council of the Philippines (WomenBizPH)		Philippines	<a href="https://www.womenbiz.ph/">https://www.womenbiz.ph/</a>					x	x		x
Water.org	Water.org is a global nonprofit organization working to bring water and sanitation to the world. We want to make it safe, accessible, and cost-effective.	USA	<a href="https://water.org">https://water.org</a>								x

Gender Assessment and Draft Gender Action Plan

CGIAR	CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land, and water systems in a climate crisis.	France	<a href="https://www.cgiar.org">https://www.cgiar.org</a>	x	x	x				
Women for Water Partnership	<p>WfWP uses water as an entry point to women’s empowerment and to improve equitable access to water for all, for all uses. Local women groups are coached and supported to manage and supervise their own projects, lobby and advocate to influence local agenda’s and to become leaders or agents of change in their constituencies. WfWP capacitates and supports member organizations to effectively contribute to the development and implementation of policies and programs in their regions and countries.</p> <p>At the global level WfWP and its member organizations use their collective voice for women in global agenda setting and contribute to international policy development through UN and other global processes. WfWP looks out for improving policies and keeping governments to their commitments. WfWP’s knowledge exchange and learning platform, along with regional workshops and peer-to-peer support, facilitates members in sharing best practices, lessons learnt and expertise on different themes. It contributes to improved project implementation, and stimulates “out of the box thinking”.</p>	USA	<a href="https://www.womenforwater.org">https://www.womenforwater.org</a> ; <a href="https://www.unwater.org/about-us/members-and-partners/water-partnership-wfwp">https://www.unwater.org/about-us/members-and-partners/water-partnership-wfwp</a>	x	x	x	x	x	x	x

Gender Assessment and Draft Gender Action Plan

<p>Association of Women in Water, Energy and Environment (AWWEE)</p>	<p>The Association of Women in Water, Energy and Environment (AWWEE) is a 501(c)(3) nonprofit organization.</p> <p>Our mission is to foster a community dedicated to the advancement of all women in the fields of water, energy and environment.</p>	<p>USA</p>	<p><a href="https://awwee.org">https://awwee.org</a></p>		<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>
<p>Asian Development Bank (ADB)</p>	<p>ADB is working across Asia and the Pacific to promote gender equality and women’s empowerment, reduce poverty, and contribute to green, equitable, and inclusive development.</p>	<p>Philippines</p>	<p><a href="https://www.adb.org/what-we-do/topics/gender">https://www.adb.org/what-we-do/topics/gender</a></p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>			<p>x</p>
<p>Bangsamoro Women Commission (BWC) of the Bangsamoro Autonomous Region of Muslim Mindanao (BARMM)</p>	<p><b>The Bangsamoro Women Commission (BWC)</b>, was created by virtue of the Bangsamoro Autonomy Act (BAA) No. 8, which was signed and approved on February 13, 2020. The BWC is mandated to “promote, protect and uphold women’s rights as human rights, work for the elimination of all forms of discrimination against women, ensure that legal measures are taken to promote gender justice, women’s rights and welfare, and promote gender and development including the meaningful participation of women in all levels of governance, policy and decision-making. In furtherance of the above-stated mandate, the Commission shall be the primary policy-making, coordinating and monitoring body of women, gender and development in the Bangsamoro Autonomous Region. The Bangsamoro Women Commission is also responsible for the development of women and their families by</p>	<p>Philippines, BARMM</p>	<p><a href="https://bwc.bangsamoro.gov.ph">https://bwc.bangsamoro.gov.ph</a></p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>	<p>x</p>



	<p>promoting and protecting their socio-economic and political rights, to attain a desired quality of life.”</p> <p>As the BWC is still new, part of their most recent activities and programs is the conduct of a series of training-workshops on the formulation of GAD, development of gender-sensitive and gender-responsive GAD agendas, GAD planning and budgeting, in order to enforce the BWC mandates stated above and enable the commission to facilitate its work. The Province of Tawi-Tawi, where the project beneficiaries of Sibutu and Sitangkai municipalities belong, endeavors to participate actively in the BWC initiatives in order to champion gender equality and mainstreaming in its predominantly islandic Muslim communities. In addition, the BWC also works closely with the Philippine Commission on Women (PCW) to ensure the alignment and harmonization of vision, mission, and goals, and the national and legal frameworks covering gender and development.</p>										
--	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--	--	--	--	--	--	--	--	--

## 4 Recommendations for Gender Mainstreaming: How can the project improve gender equality and women’s empowerment?

The project has the potential to address many deeply rooted gender issues, including:

- **Increase women’s access to employment, knowledge and decision making:** For the women and youth, jobs may be generated in the energy and water sector. Technical and vocational training programs will be beneficial for them in order to become contributors and active players in the economic productivity of the community. For instance, skills training on plumbing and piping, machining and welding, solar power installation and maintenance courses, electrical wiring, computer skills, accounting, social work, administrative and logistical skills, and other soft/hard skills relevant in these energy and water sectors. Enhanced knowledge and financial resources will also allow women to increase their participation in household and community decision making.
- **Change traditional gender norms and roles:** The project can raise awareness on women’s role in the seaweed value chain, and change underlying gender bias, norms and roles; enhancing the role of women can increase their decision making power, reduce gender based violence, and thereby improve women’s livelihoods.
- **Enhance literacy for girls and boys:** The project can link participation of young women and men in the project activities to their participation in school and in this way increase education levels and literacy.

### 4.1 General Recommendations

The following table summarizes recommendations on how this project can contribute to enhance gender equality and empower women at various levels to contribute to SDG5. UNIDO’s Guide on Gender Mainstreaming Energy and Climate Change Projects is being used as a guide in order to ensure that this project is in line with both UNIDO and AF requirements. Based on this, attention will be paid to:

<p><b>Gender-responsive log frame, gender analysis and Gender Action Plan</b></p>	<p>In the project design UNIDO has conducted a gender analysis to ensure that the relevant gender dimensions are considered, and the project log-frame developed reflects key gender dimensions of the respective outputs, activities, indicators and targets. The (draft) Gender Action Plan (GAP) identifies how the project can improve gender equality and proposes gender specific targets to be monitored and evaluated throughout the project implementation period. The GAP will be reviewed early in the project and where necessary the review will allow for adjustments of the gender related targets, will capture the gender dimension in the first year of the project and define the ways in which the project can achieve, or improve on, its gender-specific targets. The GAP, when finalized and adopted, shall be subject to regular monitoring and evaluation.</p>
<p><b>Collection of gender- and age-disaggregated data.</b></p>	<p>When possible, indicators measuring the progress and impact of the project implementation shall be gender- and age-disaggregated. Gender-disaggregated data are key to better understanding of women’s roles, needs and priorities. Age disaggregated data will provide information on the role of children and youth. Data will be further differentiated by disability, or economic status if possible to better understand intersectionality and address relevant issues.</p>
<p><b>Gender balance and Gender-sensitive recruitment</b></p>	<p>Mechanisms to ensure <b>gender balanced representation</b> and participation in project activities and decision-making process will be established along with the gender-specific targets or indicators that track gender results and impact. To the greatest possible extent, <b>Gender-sensitive recruitment</b> at all levels where possible, especially in selection of project staff. Gender responsive TORs will be used to mainstream gender in the activities of project executing</p>

	partners, consultants and experts. In cases where the project does not have direct influence, gender-sensitive recruitment will be encouraged.
<b>Women-focused interventions</b>	<b>The project will consider women-targeted interventions</b> to promote gender equality, encourage women’s participation, and enhance women’s empowerment. For instance, this will include target training for women seaweed farmers as well as interventions to reduce gender bias and shed light on the role of women.
Gender responsive <b>decision-making processes</b>	Considering gender dimensions in all <b>decision-making processes</b> (this will consider but will not be limited to efforts to achieve gender balance/ representation in such processes), including Project Steering Committee meetings. Consultations with and <b>involvement of stakeholders</b> focusing on gender equality and women’s empowerment issues, such as gender focal points of involved stakeholders, gender experts and organizations, CSOs and NGOs promoting GEEW (providing them with equal voice).
<b>Sensitization and capacity building</b> of project stakeholders	Across all components of the project, it is recommended to initiate the process of gender integration with a series of gender sensitization workshops for all stakeholders, including project management unit (PMU) staff, consultants of project executing entities. These trainings shall ensure a shared understanding of gender across the project. In addition, all UNIDO consultants and contractors providing training under the project will have to complete the “I know gender 1-2-3” course from UN Women. The aim is that all those involved will understand gender-bias, the importance for gender equality and how they can apply a gender lens to their respective work. It is expected that once the stakeholders have a shared understanding of gender and its role for the project, they can take it forward and integrate gender in their own contexts. This would also mean that the stakeholders would be more involved and hence improve the overall outcome of the project. Such an approach would also lead to a more sustainable project implementation, where individual stakeholders own the project even after the withdrawal of the handholding support by UNIDO and its consultants. To enhance ownership it is recommended to also appoint a compliance and gender focal point at the project executing entities, such as MINDA and the LGUs of Sibutu and Sitangkai.

## 4.2 Draft Gender Action Plan

Table 10 provides an overview of the project activities, and a **draft Gender Action Plan (GAP)**. A more detailed Gender Action Plan will be developed during inception phase and will include:

- Vision
- Principles
- Objectives
- Gender Baseline
- Time-bound targets to be achieved (short- and long-term)
- Outputs to achieve policy objectives
- Stakeholder responsibilities
- Allocated resources

With this the project will make sure that women’s needs and priorities are taken into due consideration, so that they can equally lead, participate, and benefit from all project activities. Infrastructure investments in general, and water and energy in particular that are designed with due consideration of gender dimensions can bring significant benefits to women in terms of increased access to employment, markets, education and health services, as well as directly reducing their time poverty.

**Table 10: Draft Gender Action Plan (GAP)**

Activities	Expected Outputs	Short description of the concrete activities the project/programme will put in place to respond to identified gender risks, differences, gaps or opportunities) with indicator and target	Indicator/ Target	Baseline	Tim eline	Resp onsi biliti es	Co sts
<b>Component 1: 1. Deployment of a resilient water supply systems integrated with existing RE infrastructure in Tawi-Tawi</b>							
<b>Outcome 1. Water infrastructure assets and services strengthened in response to climate change impacts, including sea level rise and rainfall variability improving livelihoods of women and communities</b>							
1.1. Water and sanitation infrastructure designed to enhance gender	1.1.1. Gender-responsive stakeholder consultations for the detailed design of the water and sanitation infrastructure	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations in assessments and planning processes, and stakeholder consultations</li> <li>- Develop detailed gender analysis; this includes</li> </ul>	Participation of 50% women and 30% youth	#/% of women (and youth) participating	start by year 1	Accre dited Entity /	to be ass

equality and women's empowerment	1.1.2. Technical design of the water and sanitation infrastructure reflects the needs of gender-groups and addresses gender equality and women's empowerment	<ul style="list-style-type: none"> <li>- Conduct separate consultations with women to identify their specific needs and possible concerns at inception phase</li> <li>- Ensure that gender dimensions of infrastructure projects are being reflected in the technical design (e.g. possible danger due to migrant workers)</li> <li>- Ensure that the team conducting the assessment and develops the feasibility study includes women, and their concerns, if subcontractor, then include this in the ToR</li> <li>- Work with men to reduce their gender bias</li> </ul>	Participation of at least 2 women's group/ association/ union  Gender responsive technical design	# of women's group/ association/ union participating		Executing Entities	essed
1.1. Desalination plant commissioned in Tongmageng and water distribution system set up in Sitangkai applying a gender-responsive approach	<p>1.1.1. Development of reverse-osmosis, modular, 1000 CMD desalination plant in Sitangkai (in Tongmageng)</p> <p>1.1.2. Addition of 1 MWp PV capacity at Tongmageng hybrid power plant to power the desalination plant</p> <p>1.1.3. Upgrading of water distribution system in Sitangkai to level 2</p>	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations in assessments and planning processes</li> <li>- Ensure that the team that implements the water systems includes women, and their concerns, if subcontractor, then include this in the ToR</li> <li>- Establish a gender focal point that is available for women during project implementation to provide information but also receive complaints</li> <li>- Ensure that gender dimensions are considered also during execution, in agile project management, when any adjustments are being made</li> <li>- Ensure that operational and maintenance can be conducted by women and that jobs are created for women in the O&amp;M</li> <li>- Ensure that the needs of women are carefully considered to develop the pilot collective sanitation systems; since Sibutu and Sitangkai are Muslim islands women have special needs that also include menstruation and pregnancy.</li> </ul>	Participation of 50% women and 30% youth  Participation of at least 2 women's group/ association/ union  At least 60% women trained and involved in O&M of the water and electrical systems  Gender grievance mechanism established and operational	#/ % of women/ men collecting water (age-disaggregation)  #/% of women/ men using, operating the desalination plant, PV system, rainwater harvesting system, water supply system (age-disaggregation)	tbd	Accredited Entity / Executing Entities	to be assessed
1.2. Water distribution system in Sibutu is retrofitted and upgraded to level 3 according to accepted national technical standards improving women's livelihoods	1.2.1. Rehabilitation and upgrading of existing level 2 water supply systems to level 3 in Sibutu Island						



1.3. Pilot collective rainwater harvesting systems installed in Sibutu and Sitangkai	1.3.1. Installation of pilot collective rainwater harvesting systems in Sitangkai and Sibutu						
1.4. Pilot collective, gender-responsive sanitation systems installed in Sibutu and Sitangkai	1.4.1. Installation of pilot collective, gender-responsive sanitation systems in Sitangkai and Sibutu						
<b>Component 2. Capacity building at local level in Tawi-Tawi</b> <b>Outcome 2. Local management structures strengthened, LGUs trained and relevant plans prepared</b>							
2.1. Water service management system in Sibutu and Sitangkai operationalized and	2.1.1. Organization and establishment of water districts	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth along the whole project development and operation of the water service management system</li> <li>- Ensure that the experts working on the water service management system are gender sensitive and consider the needs of women</li> </ul>	Participation of at least 40% women	#/% of of women participating	tbd		
	2.1.2. Provision of digital solutions for payments and management of the water distribution system	<ul style="list-style-type: none"> <li>- Ensure that women have equal decision making power over the water service management system; establish modus operandi for joint ownership</li> <li>- Ensure that the digital solutions are inclusive, accessible to women, and that women are involved in their development and design</li> </ul>	Participation of at least 2 women's groups/ associations/ unions  Identify at least 2 partners that	# of women's group/ association/ union participating  # of partners that include women's	tbd		
	2.1.3. Building capacity of LGUs in sustainable water and energy system management, in the context of climate change, with focus on equitable access to water for all groups, including specific needs of women and youth	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations</li> <li>- Develop and provide targeted training for women and women's associations/ groups.</li> <li>- Develop and provide interactive and hands-on training/ workshop on gender mainstreaming the local water-energy-food planning</li> <li>- Conduct separate consultations and focus group meetings with women to identify more specific needs and possible concerns for their involvement in decision making at community level</li> </ul>	include women's groups and gender focal points and involved them in the development of training modules and seminars	groups and gender focal points and involved them in the development of training modules and seminars	tbd	Accredited Entity / Executing Entities	to be assessed

		<ul style="list-style-type: none"> <li>- Include women’s groups and gender focal points to ensure that the training modules and seminars, and material are gender sensitive</li> <li>- Include women in leadership positions, as women are role models for motivating other women to participate.</li> <li>- Ensure conditions for women's participation in trainings is conducive e.g. through the provision of childcare, nursing rooms, arrangement of transport, separation of women from men during breaks for coffee and lunch (if needed due to Muslim rules and traditions).</li> <li>- Targeted training for youths and youth associations/ groups.</li> </ul>	<p>100% of new or updated Local Climate Change Action Plans include gender dimensions</p> <p>At least 40% women in the team developing the New or updated Local Climate Change Action Plans</p>	<p># of new or updated Local Climate Change Action Plans include gender dimensions</p> <p>#/% of women with access to mobile phones</p>			
2.2. Local development planning strengthened	2.2.1. New or updated Local Climate Change Action Plans prepared	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations in development of the action plan</li> <li>- Develop detailed gender analysis and involve gender experts, and organizations that promote GEEW; this includes                             <ul style="list-style-type: none"> <li>- Conduct separate consultations with women to identify their specific needs and possible concerns at inception phase</li> <li>- Ensure that gender dimensions of infrastructure projects are being considered (e.g. possible danger due to migrant workers)</li> </ul> </li> <li>- Ensure that the team developing the action plan includes women and their concerns, if subcontractor, then include this in the ToR</li> <li>- Ensure that gender dimensions of climate change are being considered</li> <li>- Establish a gender focal point</li> </ul>			tbd	Accredited Entity / Executing Entities	to be assessed
	2.2.2 Awareness raising campaign for LGUs on climate justice with focus on gender, intersectionality and youth	<ul style="list-style-type: none"> <li>- Ensure participation of men and youth, and their unions/ associations</li> <li>- Develop tailored awareness raising and capacity building material</li> <li>- Involve stakeholders such as women’s and men’s unions and associations, experts, and mediators to assess the issue, develop and conduct the activities;</li> </ul>	<p>Participation of at least 50% women, 50% youth</p>	<p>#/% of of women (and youth) participating</p> <p># of women's group/ association/</p>	tbd	Accredited Entity / Executing Entities	to be assessed
	2.2.3 Capacity building of LGUs on mainstreaming gender and youth into their policies and work						

		- Provide active involvement and hand-holding also after the training and awareness raising to ensure that expected results are being achieved		union participating			
<b>Component 3. Upgrading of seaweeds industry in Tawi-Tawi</b> <b>Outcome 3. Seaweed production strategies strengthened in relation to climate change impacts, including variability</b>							
3.1. Differentiated gender groups and sub-groups in Seaweed farming communities supported with relevant skills and solutions to address climate change	3.1.1. Development of targeted strategy for climate-resilient, gender and youth-focused seaweeds production in the region	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations in strategy development for climate-resilient seaweeds production</li> <li>- Develop detailed gender analysis and involve gender experts, and organizations that promote GEEW to inform the development of the strategy; this includes                             <ul style="list-style-type: none"> <li>- Conduct separate consultations with women to identify their specific needs and possible concerns at inception phase</li> <li>- Ensure that gender dimensions of infrastructure projects are being considered (e.g. possible danger due to migrant workers)</li> </ul> </li> <li>- Assess women’s involvement in the seaweed value chain, their pay, and decision making power</li> <li>- Develop and implement a dissemination strategy that is gender responsive to reach women</li> <li>- Develop and conduct activities targeting youth such as an awareness raising campaigns on climate change and adaptation to water scarcity, collaborative innovation workshop for students, school project in primary and secondary school, workshops, study tours, site visits</li> </ul>	Participation of 50% women (and 30% youth)  Participation of at least 1 women's group/ association/ union  Needs assessment conducted	#/% of women led seaweed farms (age-disaggregation)  #/% of women working in seaweed farms (age-disaggregation)  Salary of women/ men working in seaweed farms (age-disaggregation)	start by year 1	Accredited Entity / Executing Entities	to be assessed
	3.1.2. Direct support to cooperatives provided in value-added seaweed processing	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations</li> <li>- Conduct separate consultations with women to identify more specific needs and possible concerns</li> <li>- Create and support a group/ chapter/ cooperative for women in seaweed production</li> </ul>	Participation of 50% women (and 30% youth)  Participation of at least 1 women's group/	# of women/ men in seaweed farming communities (age-	tdb	Accredited Entity / Executing	to be assessed

		<ul style="list-style-type: none"> <li>- Develop and provide targeted training for women and women’s associations/ groups; e.g. skills upgrade so that women (or their associations) can be farm owners and managers, this would include building their managerial skills, business mindset, entrepreneurial skills</li> <li>- Identify at least 2 partners that include women’s groups and gender focal points to ensure that the training modules and seminars, and material are gender sensitive</li> <li>- Develop and conduct targeted training for youths and youth associations/ groups.</li> </ul>	<p>association/ union</p> <p>Needs assessment conducted</p>	<p>disaggregation)</p> <p># of women/ men in seaweed farming cooperatives and their position/ role (e.g. leadership), (age- disaggregation)</p>		Entities	
3.2. Seaweed producing women groups on each island established or strengthened with direct capacity building support.	3.2.1. Strengthening capacity of women in seaweed processing value chain through establishing and supporting women groups	<ul style="list-style-type: none"> <li>- Ensure participation of women and youth and their unions/ associations in development of the training</li> <li>- Conduct separate consultations with women to identify more specific needs and possible concerns and develop needs assessment</li> <li>- Develop and conduct targeted activities for women to facilitate their involvement in the groups.</li> <li>- Identify at least 2 partners that include women’s groups and gender focal points to ensure that the training modules and seminars, and material are gender sensitive</li> </ul>	<p>Participation of at least 50% women (and 50% youth)</p> <p>Establishing of supporting at least 2 women's groups/ association/ union</p>	<p>#/% of women led seaweed farms</p> <p>#/% of women working in seaweed farms</p>	tbd	Accredited Entity / Executing Entities	to be assessed
	3.2.2. Building awareness on women’s role the in seaweed value chain	<ul style="list-style-type: none"> <li>- Ensure participation of women, men and youth and their unions/ associations in development of the activities</li> <li>- Develop and disseminate gender responsive awareness raising material</li> <li>- Conduct separate training/ workshop for men to make them aware about women’s involvement in seaweed value chain to recognize women’s role</li> <li>- Develop and disseminate gender responsive press releases and press kits, including articles on women and their role in climate change, water-gender nexus, etc.</li> </ul>	<p>Participation of at least 50% women (and 30% youth)</p> <p>Participation of at least 1 women's group/ association/ union</p>	<p>time of women/ men/ youth spent of seaweed farming</p> <p># of women’s groups established/ supported</p>	tbd	Accredited Entity / Executing Entities	to be assessed

		<ul style="list-style-type: none"> <li>- Develop and conduct a campaign to raise awareness on women’s role in the seaweed value chain to empower women and enhance Women’s involvement in decision making, and work on behavioral changes.</li> <li>- Develop and conduct targeted activities for women at the community level, targeting also women-headed households (if these exist in the islands), to enhance their self-esteem so they are encouraged to talk about their work and supporting development of their personality and attitudes.</li> <li>- Identify at least 2 partners that include women’s groups, men’s groups and gender focal points to ensure that the training modules and seminars, and material are gender sensitive</li> </ul>	Awareness assessment conducted				
<b>Component 4. Awareness raising and knowledge sharing</b> <b>Outcome 4. Local community resilience of differentiated gender groups and sub-groups in increased and knowledge shared</b>							
4.1. Differentiated gender groups and sub-groups in Local communities trained in climate change adaptation solutions	4.1.1. Building community resilience through awareness raising of climate change and available adaptation solutions related to water management	<p>Ensure participation of women and youth and their unions/ associations</p> <p>Develop and provide targeted training for women and women’s associations/ groups.</p> <p>Conduct separate consultations and focus group meetings with women to identify their specific needs and possible concerns</p> <p>Identify partners that include women’s groups and gender focal points to ensure that the training modules and seminars, and material are gender sensitive</p> <p>Ensure participation of women in leadership positions, as women are role models for motivating other women to participate.</p> <p>Ensure conditions for women's participation in training is conducive e.g. through the provision of childcare, nursing rooms, arrangement of transport, separation of women from men during breaks for coffee and lunch (if needed due to Muslim rules and traditions).</p> <p>Targeted training for youths and youth associations/ groups.</p>	<p>participation of 50% women (and 50% youth)</p> <p>participation of at least 1 women's group/ association/ union</p> <p>Identify at least 2 partners that include women’s groups and gender focal points and involved them in the development of training</p>	<p>#/% of climate change awareness raising material that is gender responsive</p> <p>#/% of women/ men (age-disaggregated) that have been trained on adaptive solutions</p>	tbd	Accredited Entity / Executing Entities	to be assessed



			modules and seminars				
4.2. Knowledge disseminated to other regions with seaweed producing women's groups	4.1.2. Disseminate knowledge to other seaweed producing communities in the region (BARMM) and elsewhere (Regions IV-B MIMAROPA and IX Zamboanga Peninsula)	<p>Conduct tailored knowledge dissemination to specific gender subgroups such as women and girls</p> <p>Ensure that the knowledge management plan is gender-responsive, e.g. contains documents on gender dimensions, a gender tag, gender-disaggregated data</p> <p>Make sure that gender aspects are centrally integrated ('mainstreamed') throughout relevant reports or publications</p> <p>Develop project lessons learnt report on gender mainstreaming, women's empowerment and youth engagement;</p> <p>Develop articles, blogs or stories to disseminate the lesson learnt</p> <p>Organize webinars/ workshops to disseminate the lesson learnt</p> <p>Develop specific training modules, 1 publication and 2 media releases focusing on GEEW and youth empowerment</p> <p>All knowledge management activities such as the knowledge management plan, project lessons learnt, publications, etc. will be gender responsive and adequate for the target group (e.g. also for the age, education level). This includes integration of gender dimensions into the content of the document, for instance presenting gender data, gender-water nexus theory, gender-sensitive language, using photos showing both women and men, showing women in leadership positions, and avoiding photos depicting gender stereotypes</p> <p>Ensure that women, men and the youth have access to and benefit from the knowledge created, e.g. disseminate the information through universities, schools, women's and youth networks and associations, etc. in a manner that is attractive and understandable for the target group</p> <p>Include women's organizations, gender equality advocates and experts as sources of information in publications, presentations, or in relevant reports</p> <p>In any knowledge/ advocacy/ training material: Use gender-insensitive language; do not perpetuate gender stereotypes; use photos to portray gender diversity and show both men and women as actors in various capacities and with various capabilities,</p>	<p>Participation of 50% women (and 50% youth)</p> <p>Participation of at least 2 women's group/ association/ union</p> <p>Develop 1 project lessons learnt report on gender mainstreaming, women's empowerment and youth engagement;</p> <p>Develop at least 2 articles, blogs or stories to disseminate the lesson learnt</p> <p>Organize at least 2 webinars/ workshops to disseminate the lesson learnt</p> <p>Develop 1 specific training modules, 1 publication and 2 media releases focusing on GEEW</p>	% of available knowledge that is gender-sensitive/ responsive	tdb	Accredited Entity / Executing Entities	to be assessed

		including those breaking the gender norms (f.ex. men doing care and youth work).	and empowerment				
<b>Component 5. Project scaling up</b>							
5.1. Documentation and plans for project scale up in the Philippines prepared	5.1.1. Consultation with relevant stakeholders (regional, national, international) including financial institutions, women's groups, youth and other donors for the development of scaling up strategy that is gender-transformative  5.1.2. Development of a project concept for the GCF	<ul style="list-style-type: none"> <li>- For the development of the project scale up plan and project proposals ensure gender responsive consultations, the identification of key gender goals and target groups, the formulation of gender-responsive project/programme indicators and the gender assessment at project/program development stage</li> <li>- Ensure participation of women and youth and their unions/ associations</li> <li>- Additional targeted earlier information and capacity building sessions might be necessary for those less knowledgeable (such as women and youth) to allow them to participate on an equal footing.</li> <li>- Ensure conditions for women's participation in training are conducive e.g. through the provision of childcare, nursing rooms, arrangement of transport, separation of women from men during breaks for coffee and lunch (if needed due to Muslim rules and traditions).</li> <li>- Organize targeted consultations (focus group meetings) for women and youth considering their requirements e.g. for the time of the consultation, location, etc (e.g. in a Muslim context women might not be able to talk openly to men and vice versa)</li> <li>- Ensure that developed documents are gender responsive</li> <li>- Develop a gender strategy and GAP for the scaling up strategy</li> </ul>	<p>Participation of 50% women (and 30% youth)</p> <p>Participation of at least 1 women's group/ association/ union</p> <p>At least 35% of the consultations (focus group meetings) are organized focusing on women, 30% for youth</p>	<p># of women consulted (during project development )</p> <p># of women's organizations consulted (during project development )</p> <p># of gender experts consulted (during project development )</p>	tbd	Accredited Entity / Executing Entities	to be assessed
<b>M&amp;E</b>							
Project M&E		<ul style="list-style-type: none"> <li>- Provide sufficient staff costs for a funding allocation for a key individual within the management team who is responsible for coordinating and overseeing the gender mainstreaming effort, including for the hiring of national gender experts/consultants as needed. The gender consultant for GAP implementation shall:</li> </ul>	At least 40% women in the PMU, as consultants and in teams of	% of funds allocated for GEEW during project development	start by year 1	Accredited Entity / Executed	to be assessed

		<ul style="list-style-type: none"> <li>- finalize and validate the initial gender assessment (in particular gender baseline)</li> <li>- provide support during its implementation</li> <li>- act as focal point to provide men and women affected by Fund supported projects and programmes with an accessible, transparent, fair and effective process for gender-related complaints and grievances.</li> <li>- Provide adequate financial resources for GAP implementation, beyond the gender expert(s)</li> <li>- Develop a gender-responsive evaluation system to ensure gender-inclusive monitoring, evaluation, and reporting with sex-disaggregated data; and ensure that MTR and TE will include gender dimensions and assess progress on gender goals and the GAP</li> <li>- Develop gender assessment report that assesses the impact on female seaweed farmers and women’s access to clean water</li> <li>- Build gender capacity of project executing entities</li> <li>- Support National Implementing Entities (NIEs) to request readiness support from the Fund in the form of Technical Assistance (TA) Grants such as the TA Grant for the ESP and Gender Policy (TA-ESGP) or TA Grant for the Gender Policy (TA-GP) to further strengthen their internal capacity to simultaneously manage environmental and social as well as gender-related risks within adaptation projects and programmes</li> </ul>	<p>subcontractors working on project activities</p> <p>At least 80% of persons working on the project have significant knowledge on gender mainstreaming</p> <p>At least 1 international and 1 national gender expert actively involved in project implementation</p>	<p>#/% of staff at the IE, NIE and EE that have gender knowledge</p>		<p>ting Entities</p>	
--	--	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------	--	----------------------	--