ADB

Regional Flyway Initiative · Site Study

May 2026

RFI Priority Site · Sibugay Wetland Nature Reserve

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Asian Development Bank

General Site Information

Country	Philippines			
RFI Site Name	Sibugay-Zamboanga (Kabasalan-Siay)			ID123
City/ Municipality, Province, Region	Sibugay-Zamboanga, Siay, Naga, Kabasalan, Ipil, RT Lim, Tungawan and Olutanga municipality			
Geographical coordinates	7.71ºN, 122.81ºE		Area (has)	175,684 ha
Key species	Far Eastern Curlew (EN), Great Knot (EN), Red Knot (NT), and Eurasian Curlew (NT), the threatened Golden-capped Fruit Bat (EN), marine turtles, Whale Shark, and Dugong			
Key habitats (biomes)	Mangroves, intertidal flats and seagrass beds			
Key ecosystem services	Coastal protection, provisioning services (food, materials)			
Key drivers of change	Aquaculture and water management, coastal development			
Conservation status (mark all that applies)		Protected Area		Flyway Network Site
		Ramsar Site		Others _____
IBA/ KBA name (and number) and other designations	The site does not overlap with an existing IBA/KBA.			
Management Stakeholders	PENRO Sibugay Zamboanga			
With management plan?	Yes			
Project concept themes	Site protection and management, wetland restoration, financing mechanism for small-scale enterprises			
Length of project	5 years			
Sector/s	Fisheries, nature-based tourism			
No. of potential beneficiaries	Estimated 150,000 direct beneficiaries			
Indigenous Peoples		No		Yes, Subanen (Lumad), Sama (Samal), Yakan, and Badjao. Samal and Yakan
Anticipated Implementation Risks	Small-scale disturbance through infrastructure creation for tourism.			
Estimated Project Budget (US$)	5,450,000 over five years			
Potential Source/s of Financing		Loan (Loan financing, with co-financing from GEF grants)		Private Sector
		Grant (to be identified)		Public-Private Partnership (Nature credits, if successful, can generate additional source of finances for wetland protection)

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Abbreviations

ADB	Asian Development Bank
AWC	Asian Waterbird Census
CSR	Conservation Status Review
DMC	Developing Member Country
EAAFP	East Asian-Australasian Flyway Partnership
ECA	Ecologically Critical Area
IBA	Important Bird and Biodiversity Area
IUCN	International Union for the Conservation of Nature
LGU	Local Government Unit
MPA	Marine Protected Area
NGO	Non-governmental Organization
PhilBio	Philippine Biodiversity Conservation Foundation Inc
RFI	Regional Flyway Initiative
SLR	Sea Level Rise
TESSA	Toolkit for Ecosystem Services Assessment
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USD	United States Dollars

Executive Summary

Kabasalan-Siay Wetland Area (also known as Sibugay Wetlands) is bounded to the west by the Zamboanga Peninsula and extends around the coastline of Sibugay Bay in western Mindanao. Kabasalan-Siay overlaps with a diverse range of coastal ecosystems, most prominently intertidal mudflats and sandflats, and some of the most extensive and intact mangrove forests and nipa stands *Nypa fruticans* left in Mindanao. Little studied until recent surveys, this coastal landscape is also represented by rocky shores, coral reefs, and seagrass beds, the latter of which is important for a known population of the Dugong *Dugong dugon*. Threatened and near-threatened migratory species known to occur here include Eurasian Curlew *Numenius arquata* (NT), Far Eastern Curlew *N. madagascariensis* (EN), Great Knot *Calidris tenuirostris* (EN), and Red Knot *C. canutus* (NT), several in congregations significant at the flyway level.

Active management interventions by the provincial authorities have increased the overall mangrove cover for Kabasalan-Siay, but there remain pertinent drivers of change from increased aquaculture conversion and to some extent, coastal development. Dams and hydrological modifications that disrupt water flow is another major issue, as well as unsustainable fishing practices. Some areas have been converted into aquaculture ponds, and the area of mangroves has been greatly increased by widespread planting. Fishing and shellfish harvesting is a major source of livelihoods for local people in the Kabasalan-Siay wetlands, and the local government recognizes that keeping the coastal wetlands healthy is beneficial to these communities. Provisioning services (for seafood products such as the locally sought-after *talaba* oyster) is an important ecosystem services for the site at the local level although recent data suggests declines in harvests, but non-timber forest products and other material harvested from the mangroves have broader benefits. Stakeholders also acknowledged the importance of the site for storm hazard regulation. Our analyses show that Kabasalan-Siay WA ranks well above the overall average for the Philippines (12,182 vs. 11,160 USD/ha) in terms of total annual benefits per unit area of mangroves, while the estimated carbon stored in Kabasalan-Siay Wetland Area (WA) ranges to as much as 8,920,000 tonnes with an annual carbon sequestration rate of 9,490-547,00 tonnes per year.

Sustainable management of the Kabasalan-Siay coastal wetlands will require continued mangrove restoration work, which should be scaled up to cover areas of the coastline that has been denuded by development, alongside active interventions to improve the management of solid waste pollution in the wider Sibugay Bay landscape. Ecotourism has been strongly advocated for by the local government and local people and is another important area that can be developed, although the current infrastructure for tourism is limited and visitors are mostly domestic. Other broader interventions that can benefit the site are capacity building activities for local communities, potentially facilitated by the LGUs, that address the issues of unsustainable fishing activities, pollution management and participatory processes and mechanisms for local people to improve stewardship of the site.

1. Background of the Regional Flyway Initiative

In July 2021, the Asian Development Bank made a commitment to develop a long-term Regional Flyway Initiative (RFI) in the East-Asian Australasian Flyway (EAAF) (Sovereign Project 55056-001) to protect and restore priority wetland ecosystems and the associated ecosystem services they provide in the EAAF, the most threatened migratory bird flyway globally. The Initiative is slated for implementation in nine ADB developing member countries (DMCs) in East, South and Southeast Asia: Mongolia, People's Republic of China (PRC), Bangladesh, Viet Nam, Cambodia, Philippines, Thailand, Malaysia and Indonesia. In 2023, the geographic scope of the RFI was further extended to two DMCs in Southeast Asia and the Pacific respectively, Lao PDR and Papua New Guinea.

The primary aim of the RFI is to enhance and expand the existing efforts in conserving and managing wetlands of the highest priority for migratory birds within the EAAF through innovative loan and grant financing, and at scale. Consultations and analyses over the development period help identify key interventions to strengthen the management of wetlands, enabling the implementation of nature-based solutions while strengthening biodiversity protection. Over time, the RFI seeks to leverage collaborative opportunities by developing partnerships among important stakeholders including national governments, civil society organizations, communities, regional organizations like the East Asian-Australasian Flyway Partnership (EAAFP), development agencies, the private sector, and other relevant entities.

Through the RFI Technical Assistance (TA) implemented over the RFI's development phase from 2021 to 2024, BirdLife International takes the lead in providing and coordinating technical support for development of the RFI. This is carried out in collaboration with the EAAFP and a consortium of international non-governmental organizations including Wetlands International and the Paulson Institute, as well as two universities, namely the University of Southampton, UK and the National University of Singapore. Over the development phase, the TA team undertook a site prioritization analysis to identify priority wetland sites in all 10 countries based on recent bird data benchmarked against internationally accepted criteria under the Convention on Wetlands of International Importance (or Ramsar Convention), EAAFP Flyway Network Sites and Important Bird and Biodiversity Areas (IBAs). The team further developed ecosystem services profiles for prioritized wetlands using a multi-pronged approach used the TESSA ecosystem services assessment tool, and data-driven modelling of water-based ecosystem services and stored carbon.

In the Philippines, a total of 20 wetland sites, including many Asian Waterbird Census (AWC) count sites, were initially assessed through data analysis and expert consultation, of which twelve (12) were defined and identified to be RFI priority sites on the basis that they support more than 1% the flyway population of at least one EAAF migratory waterbird species. The majority of the RFI wetlands prioritized for the Philippines are coastal wetlands, a consequence of the country's long coastline, with the largest cluster of priority sites being North Manila Bay, which constitutes three sites across the provincial jurisdictions of Bataan, Pampanga and Bulacan. 28 EAAF species exceeded the 1% threshold at the site level, with species such as Chinese Crested Tern, Chinese Egret and the Tufted Duck.

2. Site profile of Kabasalan-Siay Wetland Area

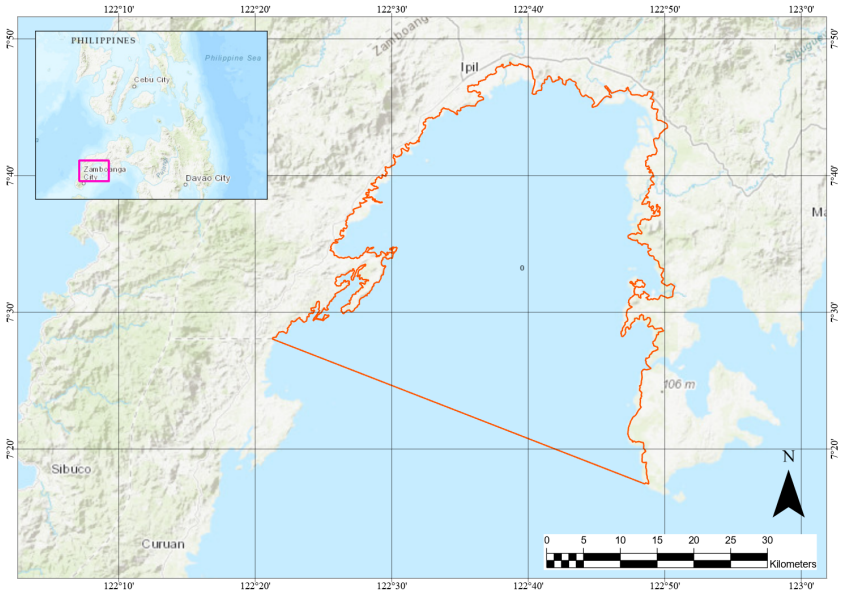

Figure 1 Map showing the full extent of the Kabasalan-Siay Wetland Area in western Mindanao.

Sibugay Wetland Nature Reserve in western Mindanao.

Location: Sibugay Wetland Nature Reserve (also known as Sibugay Wetlands) extends around the coastline of Sibugay Bay, in the south of the Zamboanga Peninsula, western Mindanao. It includes Siay, Naga, Kabasalan, Ipil, RT Lim, Tungawan and Olutanga municipalities.

Area: The Sibugay Wetlands RFI site covers an area of 175,684 ha.

Altitude: Sea-level.

Geographical coordinates: 7.71ºN, 122.81ºE

Description of site: Kabasalan-Siay Wetland Area comprises a wide range of coastal ecosystems, including extensive tidal mudflats and sandflats, rocky marine shores, coral reefs, seagrass beds, mangroves and nipa forests, estuarine waters, and shallow marine waters. Some areas have been converted into aquaculture ponds; however, the area of mangroves has been greatly increased by widespread planting.

Site administration, management and land tenure: The coastal wetlands in Siay and Kabasalan municipalities have been recently declared as the ninth Ramsar site in the Philippines[1], and as a new East Asian-Australasian Flyway Network Site. The Department of Environment and Natural Resources (DENR) Region 9 and the Philippines Biodiversity Conservation Foundation Inc. (PhilBio), a conservation NGO, are working with the Provincial Environment and Natural Resources Office (PENRO) Zamboanga Sibugay and

[1] Ramsar Site Information Sheet: Sibugay Wetland Nature Reserve. Available at: https://rsis.ramsar.org/ris/2552

the Local Government Units around Sibugay Bay to compile the data needed to support these new site designations.[2]

Social and economic values: One of the main economic activities in the Kabasalan-Siay wetlands is fishing, and the local authorities recognize that keeping the coastal areas healthy is key to maintaining a sustainable food supply. These wetlands have great potential for nature tourism, which is already a source of livelihood for the people in the area[3]. DENR Region 9 has collaborated with the Department of Education and local schools to organize conservation education activities on World Wetlands Day[4].

3. Biodiversity value of Kabasalan-Siay Wetland Area

3.1 Key habitats

Kabasalan-Siay Wetland Area comprises a wide range of coastal ecosystems, including extensive tidal mudflats and sandflats, rocky marine shores, coral reefs, seagrass beds, mangroves, nipa forests, estuarine waters, and shallow marine waters. Some areas have been converted into aquaculture ponds; however, the area of mangroves has been greatly increased by widespread planting.

3.2 Importance of Kabasalan-Siay Wetland Area to migratory waterbird species

The extensive coastal wetlands in Kabasalan-Siay Zamboanga Wetland Area support large congregations of egrets and other waterbirds, with 53 waterbird species reported to occur there based on surveys led by the PENRO. Waterbird count data from the 2019, 2020 and 2021 Asian Waterbird Census was used in the analysis for this site. The counts from these three years were averaged and then compared to the CSR1 1% population estimates to calculate a score for each species. AWC counts of two egret species were found to exceed the 1% population estimates, and the scores for these species were summed to produce the overall site score for Kabasalan-Siay Zamboanga Wetland Area (Table 1).

[2] www.facebook.com/philippinesbiodiversity/posts/sibugay-wetlands-187000-hectare-area-is-home-to-53-waterbird-species-including-1/6135504446475930/
[3] https://businessmirror.com.ph/2022/07/03/sibugay-coastal-wetlands-eyed-for-ramsar-listing/
[4] https://r9.denr.gov.ph/index.php/news-events/15-press-releases/1550-envi-forum-and-on-the-spot-poster-making-contest-increase-awareness-on-wetland-conservation#:~:text=The%20Sibugay%20Coastal%20Wetlands%20which,rich%20and%20unique%20biodiversity%20value

Table 1 List of migratory species (based on the EAAFP list of species) with globally significant congregations in Kabasalan-Siay wetlands.

Scientific name	IUCN	Average count	CSR1	CSR1 score
Great White Egret *Ardea alba*	LC	1,766	1,000	1.8
Intermediate Egret *Ardea intermedia*	LC	1,304	1,000	1.3

Kabasalan-Siay Zamboanga Wetland Area supports important populations of several globally threatened and near-threatened species (see also Fernandez et al. 2022), including Eurasian Curlew *Numenius arquata* (NT), Far Eastern Curlew *N. madagascariensis* (EN) (mean annual count of 240 individuals during 2019-2022 AWC, with reports that counts of this species sometimes exceed the 1% population threshold), Great Knot *Calidris tenuirostris* (EN) (mean annual count of 733 individuals during 2019-2022 AWC) and Red Knot *C. canutus* (NT). Several banded Far Eastern Curlews have been recorded in Kabasalan-Siay Zamboanga Wetland Area, including birds marked in China (at Luannan-Zuidong coast and Chongming Dongtan, both also RFI priority sites), Russia (Khairusova and Belogovaya River estuaries), Japan and Australia.

3.3 Other notable biodiversity

The Kabasalan-Siay Wetland Area is reported to support as estimated over half a million flying foxes, including the threatened Golden-capped Fruit Bat *Acerodon jubatus* (EN). The coastal waters off Zamboanga provide staging, roosting and foraging grounds for several species of marine turtles and Whale Shark *Rhincodon typus* (EN), while other notable species that occur include Dugong *Dugong dugon* (VU) and Saltwater Crocodile *Crocodylus porosus* (LC). The extensive mudflats are home to a variety of oysters, scallops, and other mollusks.

4. Ecosystem services

4.1. Ecosystem services provided by Kabasalan-Siay Wetland Area

Kabasalan-Siay overlaps with diverse coastal wetland habitats, which in turn provide valuable provisioning, regulating, and cultural ecosystem services (Figure 2). The results from the RFI workshop[5] with local stakeholders highlights the top ecosystem services provided by the site's wetlands, emphasizing their essential and non-substitutable nature (Table 2). Provisioning services such as food are marked as essential and primarily benefit communities within the site. An oyster species, *Saccosrea malabonensis* locally known as 'talaba', is popularly harvested by local communities in the estuarine areas of the Sibugay River, especially in Barangay Concepcion (Lim & Flores 2017). Wood products and fiber benefit both local and distant communities. Regulating services include local climate regulation, which benefits local communities within the site. Storm hazard regulation also benefits local communities. Pollination, considered essential, benefits communities within the site.

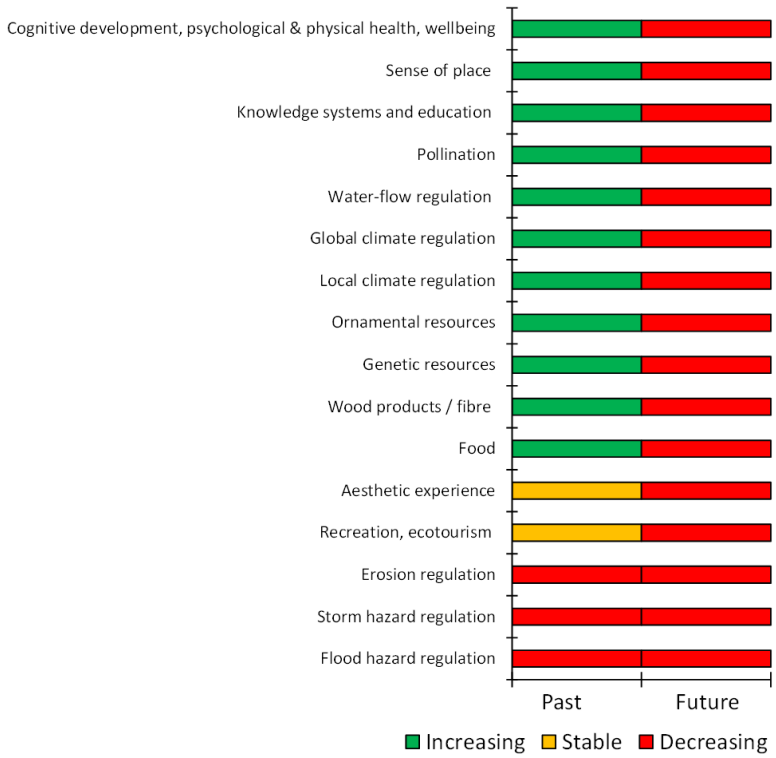

Figure 2 List of ecosystem services provided by Kabasalan-Siay Wetland Area, as identified through stakeholder consultation at the Regional Flyway Initiative workshop.

[5] Asian Development Bank. (2023, June 27–30). *Philippines: Wetland Ecosystem Services Workshop* [Workshop]. Asian Development Bank Headquarters, Manila, Philippines. https://events.development.asia/learning-events/philippines-wetland-ecosystem-services-workshop

Table 2 List of top ecosystem services provided by Kabasalan-Siay Wetland Area.

Ecosystem services	Essential or non-substitutable	Benefits to communities			Change	
		Within the site	Adjacent to the site	Distant to the site	Past	Future
Provisioning services						
Food	Yes	✓			Increase	Decrease
Wood products/fiber		✓		✓	Increase	Decrease
Regulating services						
Local climate regulation		✓			Increase	Decrease
Storm hazard regulation		✓			Decrease	Decrease
Pollination	Yes	✓			Increase	Decrease

4.2. Global climate regulating services

Based on systematic reviews (Chen and Lee, 2022; Stankovic et al., 2023), the amount of carbon stored in Kabasalan-Siay Wetland Area (WA) is estimated to range from 594,000 to 8,920,000 tonnes, while the annual carbon sequestration rate is estimated to be between 9,490 and 547,00 tonnes per year.

4.3. Coastal protection services

The coastal protection services provided by Kabasalan-Siay Wetland Area (WA) were assessed using both biophysical indices and monetary values (see Tables A1 and A2, and Annex 1 for details). When compared to both the average of the nine RFI coastal sites and the average of all other coastal areas in the Philippines (Table A3 in Annex 1), Kabasalan-Siay WA shows only partly mixed results in terms of risk level:

(1) for the potential exposure to coastal hazards, Kabasalan-Siay WA is consistently below average (index: 2.24 vs. 2.70 for RFI coastal sites and 2.36 for all other coastal areas);

(2) for the contribution to reducing coastal risk as a proportion of population density with 2.5 km of the coast, Kabasalan-Siay WA is also consistently below average (50 vs. 306 people/ha for RFI coastal sites and 122 people/ha for all other coastal areas); but

(3) for the contribution to reducing coastal risk as a percentage of the maximum potential exposure, Kabasalan-Siay WA is above average (8.24% vs. 5.28% for RFI coastal sites and 6.60% for all other coastal areas).

In monetary terms (Table A4 in Annex 1), Kabasalan-Siay WA ranks below the national RFI average (12,182 vs. 14,895 USD/ha) but above the overall country average (12,182 vs. 11,160 USD/ha) in terms of total annual benefits per ha of mangroves. At the same time, these benefits for the total area of Kabasalan-Siay WA are well above the average of all RFI coastal sites in the Philippines (86.3 vs. 16.4 million USD).

5. Drivers of change and their potential impacts on Kabasalan-Siay Wetland Area

5.1. Current drivers of change and their level of impact

Thirty (30) drivers of change were identified by local and national stakeholders at the RFI workshop[6] to impact the Kabasalan-Siay Wetland Area (see Table 3). Aquaculture pose substantial threats (i.e., high impact) to the wetland's ecosystem, affecting water quality and habitat conditions. Medium-impact drivers include dams and hydrological modifications that alter water flow and disrupt the wetland's ecological processes. Lim & Flores (2017) reported that coastal sedimentation as a result of upstream processes may have impacted local harvests of shellfish, and resulting in a decline in the *talaba* harvest. Fishing, killing, and harvesting of aquatic resources are also noted to have a medium impact, threatening the wetland's biodiversity. Development activities, such as housing and settlement, contribute further to habitat alteration and fragmentation, indicating a need for sustainable land-use practices.

[6] Asian Development Bank. (2023, June 27–30). *Philippines: Wetland Ecosystem Services Workshop* [Workshop]. Asian Development Bank Headquarters, Manila, Philippines. https://events.development.asia/learning-events/philippines-wetland-ecosystem-services-workshop

Table 3 Drivers of change and their potential impact on the integrity of Kabasalan-Siay Wetland Area based on consultations with stakeholders.

Driver of change	Impact
Marine and freshwater aquaculture	High
Restoration for conservation	
Dams, hydrological modification and water management/use	Medium
Fishing, killing and harvesting of aquatic resources	
Housing and settlement	
Activities of site managers	Low
Agricultural and forestry effluents	
Avalanches/landslides	
Collecting terrestrial plants or plant products (non-timber)	
Commercial and industrial areas	
Dams within or upstream of the wetland site, which alter the hydrological regime	
Droughts	
Earthquakes/tsunamis	
Erosion and siltation/deposition	
Garbage and solid waste	
Habitat clearing	
Habitat shifting and alteration	
Household sewage and urban waste water from outside the wetland site	
Hunting, killing and collecting of terrestrial animals	
Increased fragmentation within the wetland site	
Logging and timber harvesting	
Ports with large scale loading and unloading of goods	
Recreational activities and tourism	
Research, education and other work-related activities	
Sewage and waste water from wetland site facilities	
Shipping lanes and canals	
Storm and flooding	
Tourism and recreation infrastructure	
Vandalism, destructive activities or threats to staff and visitors	
Water extraction/diversion within the wetland site or catchment	

5.2. Potential alternative state of Kabasalan-Siay Wetland Area under current drivers of change

Stakeholders at the RFI workshop[7] defined the most plausible future alternative state (to 2035), and how this will translate to a net change in the cover of different types of wetland habitat types within this site (current habitat cover vs future alternative cover; Figure 3). The alternative state of the site assumes there will be no changes in the current drivers of change impacting the site, and the current management regime.

[7] Asian Development Bank. (2023, June 27–30). *Philippines: Wetland Ecosystem Services Workshop* [Workshop]. Asian Development Bank Headquarters, Manila, Philippines. https://events.development.asia/learning-events/philippines-wetland-ecosystem-services-workshop

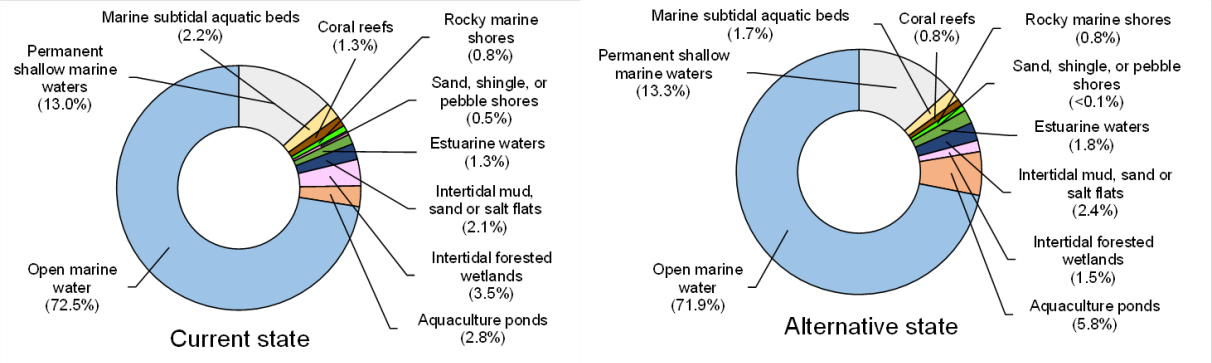

Figure 3 The proportional change in the extent of different habitat types between the current and alternative states of Kabasalan-Siay Wetland Area.

5.3. Expected changes in the ecosystem services of Kabasalan-Siay Wetland Area

Stakeholders at the RFI workshop[8] documented the future trends in the provision of ecosystem services in Kabasalan-Siay Wetland Area, indicating if the ecosystem services provided by this site (to 2035) will increase, decrease, or will remain stable, assuming that the current drivers of change impacting this site will continue in their present condition, with the intervention remains unchanged.

Figure 2 and Table 2 highlight that future provisioning services such as food are predicted to decrease despite an increase in the past. Wood products and fiber show an increase in the past but a projected decrease in the future. Regulating services include local climate regulation show an increase in the past but a predicted decrease in the future. A decrease in storm hazard regulation is noted in both past and future contexts. Pollination has seen an increase in the past but faces a potential decrease in the future.

In the alternative state, the loss of 57% of mangroves and 23% seagrasses and the gain of 14% of intertidal mudflats are expected to result in a loss of stored carbon estimated to be between 91,700 and 4,650,000 tonnes and a loss of carbon sequestration (carbon accumulation) by approximately from 1,970 and 27,800 tonnes per year

A loss of 3,513.6 ha of mangroves as presented in Table A5, however equivalent to only 2% of the total land use for the site, is expected to result in roughly a 50% reduction in coastal protection. This may amount to nearly 43 million USD in lost total benefits per year (based on 12,182 USD per hectare of mangroves) and 780 million USD in lost total benefits per 100-year return period storm (based on the same 50% reduction in coastal protection).

[8] Asian Development Bank. (2023, June 27–30). *Philippines: Wetland Ecosystem Services Workshop* [Workshop]. Asian Development Bank Headquarters, Manila, Philippines. https://events.development.asia/learning-events/philippines-wetland-ecosystem-services-workshop

6. Capacity needs in Kabasalan-Siay Wetland Area

Stakeholders for Kabasalan-Siay assessed capacity needs for identified priority areas for wetland management (Table 4) and highlighted local gaps and needs (rated 1) for most site-level management priorities ranging from participatory management of the site by local stakeholders and ecosystem services assessment to livelihoods and climate risk reduction.

Table 4 Capacity needs at the site-level management of the Kabasalan-Siay Wetland Area (0 for limited capacity, and 3 for high capacity).

Site-level capacity gaps	Score: Wetland Protected Areas	Score: Wetlands with no formal protection
Wetland research and monitoring	2	2
Invasive species control	1	1
Establishing positive incentives for wetland conservation	1	1
Communication, Education and Public Awareness for wetland conservation/sustainable use	2	2
Cross-sectoral/participatory management for wetlands	1	1
Wetland ecosystem services/values assessment	1	1
Wetland management planning	2	2
Project management	2	2
Climate change and disaster risk reduction	1	1
Eco-tourism	2	2
Sustainable livelihoods	1	1
Waterbird flyway conservation	2	2
Waterbird monitoring	2	2
Wetland management for waterbirds	2	2

7. Opportunities for RFI interventions

7.1 Recommended Interventions

The extensive coastal wetlands across Sibugay Bay supports some of the largest remaining stands of intact mangroves in Mindanao, and the wider southern Philippines and has been recently nominated by the Philippine Government as a Ramsar Wetland of International Importance.

Mangrove restoration undertaken by PENRO Zamboanga has already restored some degraded areas of mangroves, including a 30-hectare mangrove area restoration proposed for a Global Environmental Facility Grant (est. 365,000 USD), but there are further opportunities for upscaling to other degraded parts of the Sibugay coastline. As a result of the site's remoteness and access issues, opportunities for international tourism are limited at present, but there is scope to improve tourism infrastructure targeting provincial-level, and regional visitors.

Table 5 Key interventions recommended for the sustainable management of the Kabasalan-Siay wetlands.

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
Component 1. Enhancement of sustainable wetland-based ecotourism					
Develop a province-wide framework and plan on nature-based tourism, with insights from vulnerable groups.	Cohesive and inclusive nature-based tourism implementation in Zamboanga Sibugay Nature-based tourism strategy and plan developed with inputs from key stakeholders Appropriate income-generating activities have been developed and tested with local communities	A province-wide framework and plan for nature-based tourism developed and disseminated to key stakeholders in Zamboanga Sibugay Number of income-generating related activities developed and tested with local communities Number of people benefitting from the income-generating activities, with focus on vulnerable groups	200,000	1.5 years	Department of Environment and Natural Resources DENR PENRO Zamboanga Sibugay Department of Tourism National Commission on Indigenous People People Organizations Concerned provincial and
Assess and implement income-generating activities for local communities, especially communities near to					

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
ecologically sensitive areas.	Nature-based tourism as a livelihood opportunity has been strengthened.				municipal government units Conservation organizations (including bird and community-focused NGOs such as PhilBio)
Improve the capacity for nature-based tourism of up to three selected municipalities	Training and capacity needs for nature-based tourism assessed Relevant training modules developed and implemented with key stakeholders (e.g., DENR, LGUs, provincial government, DoT, local communities) Improved capacity of key stakeholders about nature-based tourism	Training Needs Assessment on nature-based tourism completed and disseminated to concerned stakeholders Number of training modules developed based on the results of training needs assessment Number of capacity-building activities administered with concerned stakeholders Number of people benefitting from the capacity-building activities, especially those from the vulnerable groups	110,000.00	5 years	
Improving basic ecotourism infrastructure including boardwalks, shelters, birdwatching hides, and signages.	Stronger (and functional) infrastructure to host tourists, including jetties, substations and house boats.	Number of infrastructure established/ improved (i.e., substation for rangers and tourists) constructed	200,000.00	3 years	
Component 2. Coastal wetland habitat protection and management					

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
Expand a local-led biodiversity and wetland monitoring scheme, with focus on shorebirds	Biodiversity and wetlands monitoring framework and mechanism for the site established. Improved local biodiversity and wetland information for better site management. Formation of a locally led conservation monitoring group led by concerned LGUs	Biodiversity and wetlands monitoring framework identified and used for site monitoring Number of monitoring reports on the biodiversity and wetland status generated, especially during the migration season A locally led conservation monitoring group organized	100,000.00	5 years	DENR Provincial Government municipal LGUs Universities Conservation organizations
Strengthen the local capacities for the management and patrolling of existing Marine Protected Areas (MPAs) in Sibugay Bay.	Training and capacity needs on MPA management and patrolling assessed Relevant training modules developed and implemented with key stakeholders (e.g., DENR, LGUs, provincial government, DoT, local communities), including exchange visits Improved capacity of key	Training Needs Assessment on MPA management and patrolling completed and disseminated to concerned stakeholders Number of training modules developed based on the results of training needs assessment Number of capacity-building activities administered with concerned stakeholders Number of people benefitting from the	200,000.00	5 years	

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
	stakeholders about MPA management and patrolling.	capacity-building activities, especially those from the vulnerable groups Locally-led patrol teams, capacitated and equipped for MPA management and patrolling in Sibugay Bay, targeted in at least two municipalities			
Component 3. Strengthening local livelihoods through microfinance mechanisms					
Developing financing instruments, including through microfinance for shellfish harvesters, tourism operators (including boat owners, guides) and small-scale fishers, and capacity building.	Improved capacity for financial management of local communities Financial mechanism and management board established to manage disbursement of small loans and grants relevant to site management Better fishing practices documented in the areas covered by the capacity-building activities	Financial mechanism and management board established to manage disbursement of small loans and grants. Microfinancing mechanism for small grants/loans to fishers strengthened or established at 2 barangays. Up to 100 small loans for tourism and shellfish-harvesting enterprises disbursed.	200,000.00	5 years	DENR BFAR DoT Provincial Government municipal LGUs Existing cooperatives Researchers Conservation organizations
Building institutional	Improved capacity for	Training Needs Assessment on	100,000.00	5 years	

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
capacity for small-scale fisheries through cooperatives.	sustainable fishing practices of local communities Training and capacity needs for small-scale fishers and ecotourism operators assessed Relevant training modules developed and implemented with key stakeholders (e.g., DENR, concerned LGUs, provincial government, DA) Improved capacity of key stakeholders about sustainable fishing practices	sustainable fishing practices completed and disseminated to concerned stakeholders Number of training modules developed based on the results of training needs assessment Number of capacity-building activities administered with concerned stakeholders Number of people benefitting from the capacity-building activities, especially those from the vulnerable groups			
Component 4. Restoration of degraded wetlands					
Upscale of mangrove restoration plots at degraded areas of mangroves along Sibugay Bay	Wetland under sustainable management scaled up; degraded mangrove areas restored and more resilient to coastal action.	Area of restored mangrove areas, with a restoration target of up to 200 ha of degraded land and degraded mangroves restored at selected plots, including unutilized aquaculture ponds,	200,000.00	5 years	DENR Provincial Government municipal LGUs local communities

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
		and the edges of aquaculture areas.			Conservation organizations
Total investment for five years			**5,450,000**		

7.2 Potential Financing

The estimated project cost is USD 5,450,000 over five years. This project budget supports the strengthening of local nature-based tourism, the restoration of degraded mangrove areas, the development of a province-wide plan for nature-based tourism, the institutionalization of a biodiversity monitoring system, and increasing local capacity on financial management, MPA management and patrolling, and nature-based tourism.

If the proposed USD 200,000 investment over five years is directed toward scaling up mangrove restoration in the Kabasalan–Siay Wetland Area along Sibugay Bay, it could enable the rehabilitation of up to 200 hectares of degraded mangroves, including disused aquaculture ponds and buffer areas around active aquaculture. With estimated coastal protection benefits of USD 12,182 per hectare annually (see Section 5.3), this nature-based intervention could generate approximately USD 2.44 million in annual benefits—equivalent to over USD 12.2 million over five years. This results in a benefit–cost ratio exceeding 60:1, highlighting the exceptional cost-effectiveness of restoring mangroves for long-term climate resilience and disaster risk reduction. In addition to buffering communities and aquaculture infrastructure from coastal erosion and storm surges, the intervention would enhance the ecological integrity of the wetland and support sustainable resource use. Allowing these degraded areas to remain unrestored would result in significant foregone protection benefits and limit the site's contribution to regional resilience and biodiversity goals.

The submitted Global Environmental Facility (GEF) Phil Flyway Project Grant included co-financing from national government agencies, the provincial government of Zamboanga Sibugay, and conservation organizations working in Sibugay Bay. Public-private partnerships for project scaling and nature credits can also be explored for Sibugay Wetlands.

7.3 Proposed Institutional Arrangements

Further work is needed to understand the role of local communities in project implementation, in consultation with LGUs and PENRO.

7.4 Project Beneficiaries

The Ramsar Information of the Sibugay Wetland Nature Reserve (covering nine municipalities) indicated about 150,000 direct and 500,000 indirect beneficiaries.[9]

Recent discussions with the DENR and the National Commission on Indigenous Peoples (NCIP) have revealed possible overlaps with ancestral domains and claims. Further discussions are necessary to understand the scope and potential engagement of indigenous peoples in the site. There are also opportunities for stronger involvement of women in several components of the proposed project, including participatory structures for site protection and management (for MPAs), and in the development of local nature-based tourism capacity.

7.5 Anticipated Implementation Risks

Climate: Climate-related risks include both the short-term and long-term disruption of habitat restoration and biodiversity conservation efforts due to extreme weather events, and coastal/ riverine flooding can affect access to ecotourism facilities. Adaptive management strategies can be further studied and integrated into the project implementation.

Environment: Nature-based ecotourism has been identified as a key project concept theme. The proposed interventions include new infrastructure, possibly shelters and boardwalks, that would enhance the tourism experience in Sibugay Wetlands. Building these infrastructures, however, would induce noise that may disturb the wildlife in the area. Moreover, the construction of tourism facilities, such as substations, may result in localized soil erosion and damage to the wetlands. Planning with stakeholders is critical before any infrastructure development.

Feasibility studies on the impact of expanding large-scale tourism are also necessary (rather than specialized ecotourism), and it is important that development that can drive mangrove loss must be averted – further safeguarding is needed to ensure the integrity of the Kabasalan-Siay mangroves is not impacted by proposed development.

Security: The Province of Zamboanga Sibugay is still a red-tagged province for security reasons. It is recommended to consider this when implementing any nature-based tourism activity.

[9] Ramsar Site Information Sheet: Sibugay Wetland Nature Reserve. Available at: https://rsis.ramsar.org/ris/2552

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Annex 1. Supplementary information on coastal protection services

To further validate the identification of the top ecosystem services by means of stakeholder consultation, an expectedly essential or non-substitutable regulating service across all RFI sites, namely coastal protection and flood mitigation (i.e., storm and flood hazard regulation), was assessed based on a combination of globally available datasets supplemented by web-based tool Co$tingNature (Mulligan, 2022). Estimates for coastal protection by mangroves (after the effects of coral reefs) were spatially inferred in QGIS from a selection of metrics expressing different biophysical and monetary values modelled by Chaplin-Kramer et al. (2023) and Menéndez et al. (2020), respectively.

The key metrics selected for biophysical values (Table A1) were current maximum potential exposure to coastal hazards, which is a vulnerability risk index calculated in InVEST[1] for several hazard variables (i.e., wind, waves, sea level rise, geomorphology, and bathymetry) in the hypothetical absence of current mangrove extent, and nature's (i.e., the mangroves') contribution to reducing this coastal risk, both as an absolute value multiplied by the local population affected and a percentage of the maximum potential exposure.

Table A1. Contribution of mangroves to coastal protection as a critical natural asset in Kabasalan-Siay WA based on site-level (biophysical) values inferred from Chaplin-Kramer et al. (2023) and expressed as ranges to represent the resulting uncertainty. Key metrics are in italics.

Critical contribution of mangroves to coastal protection (metrics)	**Risk levels**
Current population density within 2.5 km of the coast (number of people per hectare)	204 – 341
Current maximum coastal risk to be mitigated, or potential exposure to coastal hazards (unitless index)	*2.20 – 2.27*
Maximum coastal risk to be mitigated, or potential exposure to coastal hazards in 2050 according to IPCC's Shared Socioeconomic Pathway #1 'Sustainability' (unitless index)	2.20 – 2.27
Maximum coastal risk to be mitigated, or potential exposure to coastal hazards in 2050 according to IPCC's Shared Socioeconomic Pathway #3 'Regional Rivalry' (unitless index)	2.47 – 2.54
Maximum coastal risk to be mitigated, or potential exposure to coastal hazards in 2050 according to IPCC's Shared Socioeconomic Pathway #5 'Fossil-fueled Development' (unitless index)	2.57 – 2.64
Current proportional risk reduction, nature's contribution to reducing coastal risk as a proportion of maximum coastal risk (unitless index)	0.18 – 0.19
Nature's contribution to reducing coastal risk as a proportion of population density within 2.5 km of the coast (# of people per hectare)	*38 – 63*

Critical contribution of mangroves to coastal protection (metrics)	Risk levels
Nature's contribution to reducing coastal risk as a percentage of the maximum potential exposure (%)	*0.080 – 0.084*

The key metrics selected for economic values (Table A2) were the annual expected flood protection benefits to total stock, which is the monetary value of the averted damages to the industrial and residential stocks (i.e., property) in 2015 US$, the same total annual benefits expressed per hectare of mangroves, and the total benefits in the event of a 100-year return period storm, which are the rarest of cyclonic conditions but cause the most flood damages to property (i.e., maximum level of coastal protection by mangroves).

Table A2. Coastal protection benefits offered by mangroves in Kabasalan-Siay WA based on site-level (monetary) values inferred from Menéndez et al. (2020) and expressed as ranges to represent the resulting uncertainty. Key metrics are in italics.

Benefits of mangroves in terms of coastal protection (metrics)	Avoided costs (US$)
Mangrove extent (hectares)[2]	4,594 – 9,578
Annual expected flood protection benefits to people (number of people)	(46,284) – 153,463
Annual expected flood protection benefits to Industrial Stock (US$)	(33,232,363) – 110,187,591
Annual expected flood protection benefits to Residential Stock (US$)	(42,680,898) – 141,515,825
Annual expected flood protection benefits to Total Stock (US$)	*(74,556,540) – 247,204,977*
Annual expected flood protection benefits to Industrial Stock per hectare of mangroves (US$ per hectare)	*(10,522) – 34,887*
1-in-100-year return period damage in terms of area flooded (number of hectares)	98 – 252
Total expected flood protection benefits of mangroves per 100-year return period storms (US$)	*(2,015,852) – 5,159,400*

Table A3. Biophysical benefits from RFI coastal wetland sites (expressed as ranges to represent the resulting uncertainty) and at the national level.

Site name	Max pot exp (index)	Risk reduction (index * pop)	Risk reduction (% max pot exp)
Bangrin Marine Protected Area	No Data	No Data	No Data

Site name	Max pot exp (index)	Risk reduction (index * pop)	Risk reduction (% max pot exp)
Kabasalan-Siay Wetland Area	2.24 (±0.03)	50 (±13)	8.2 (±0.2)
Negros Occidental Coastal Wetlands Conservation Area (NOCWCA)	2.55 (±0.04)	187 (±37)	4.8 (±0.3)
North Manila Bay (Balanga Wetlands Park)	No Data	No Data	No Data
North Manila Bay (Pampanga River East Bank)	3.16 (±0.03)	296 (±451)	3.3 (±0.6)
North Manila Bay (Sasmuan Pampanga Coastal Wetland)	2.99 (±0.06)	18 (±28)	5.3 (±1.3)
Olango Island Wildlife Sanctuary	2.77 (±0.09)	496 (±87)	7.7 (±0.2)
Panabo Coast	2.40 (±0.05)	1,537 (±617)	8.1 (±0.5)
Tubbataha Reef Natural Park	2.82 (±0.04)	Not Applicable	0.8 (±2.1)
Philippines RFI average	2.70	306	5.28
Philippines national average	2.36	122	6.60

Table A4. Monetary benefits from RFI coastal wetland sites (expressed as ranges to represent the resulting uncertainty) and at the national level.

Site name	Total annual benefits (US$)	Per mangrove area (US$/ha)	For 100-yr return period storms (US$)
Bangrin Marine Protected Area	1,045,290 (±98,880)	15,294 (±1,447)	331,327 (±31,342)
Kabasalan-Siay Wetland Area	86,324,218 (±160,880,759)	12,182 (±22,704)	1,571,774 (±3,587,626)

Site name	Total annual benefits (US$)	Per mangrove area (US$/ha)	For 100-yr return period storms (US$)
Negros Occidental Coastal Wetlands Conservation Area (NOCWCA)	2,511,290 (±2,318,575)	1,687 (±1,557)	5,477,498 (±5,654,072)
North Manila Bay (Balanga Wetlands Park)	1,207,200 (±572,108)	28,002 (±13,270)	202,433 (±6,784)
North Manila Bay (Pampanga River East Bank)	3,621,601 (±33,678,493)	4,200 (±39,060)	6,609,485 (±106,458,484)
North Manila Bay (Sasmuan Pampanga Coastal Wetland)	3,621,601 (±102,747)	28,002 (±794)	607,298 (±17,229)
Olango Island Wildlife Sanctuary	No Data	No Data	No Data
Panabo Coast	No Data	No Data	No Data
Tubbataha Reef Natural Park	No Data	No Data	No Data
Philippines RFI average	16,388,533	14,895	2,466,636
Philippines RFI total	98,331,201	Not Applicable	14,799,814
Philippines national average	1,849,798	11,160	4,933,082
Philippines national total	789,863,793	Not Applicable	2,136,024,319

Table A5. Key habitat types in Kabasalan-Siay Wetland Area based on stakeholder-based assessment at the Regional Flyway Initiative workshop in June 2023.

Habitat type	Current state		Alternative state (2035)	
	Area (ha)	Cover (%)	Area (ha)	Cover (%)
Permanent shallow marine waters	22838.9	13.0	23366.0	13.3
Marine subtidal aquatic beds	3794.8	2.2	2916.4	1.7
Coral reefs	2371.7	1.3	1493.3	0.8
Rocky marine shores	1405.5	0.8	1405.5	0.8
Sand, shingle, or pebble shores	931.1	0.5	52.7	0.0
Estuarine waters	2283.9	1.3	3162.3	1.8
Intertidal mud, sand or salt flats	3689.4	2.1	4216.4	2.4
Intertidal forested wetlands	6148.9	3.5	2635.3	1.5
Aquaculture ponds	4831.3	2.8	10101.8	5.8
Open marine water	127388.5	72.5	126334.4	71.9
Total	175684.0	100.0	175684.0	100.0

[1] https://naturalcapitalproject.stanford.edu/invest/coastal-vulnerability

[2] The reference value used by Menéndez et al. (2020) for their modelling is c. 565 ha, remote sensing data from ESA World Cover 2020 map at 10m resolution.