ADB

Regional Flyway Initiative · Site Study

May 2026

RFI Priority Site · Olango Island Wildlife Sanctuary

Prepared by Ding Li Yong & Mike Crosby, with additional input from Billy Fairburn, Kelvin Peh, Evelyn Pina-Covarrubias, Stefano Barchiesi and Radhika Bhargava

BirdLife International, University of Southampton, University of Singapore

Asian Development Bank

General Site Information

Country	Philippines		
RFI Site Name	Olango Island Wildlife Sanctuary		ID116
City/ Municipality, Province, Region	Lapu Lapu City, Cebu		
Geographical coordinates	10.25 N, 124.05 E	Area (has)	1,383 has
Key species	Asian Dowitcher Limnodromus semipalmatus (NT), Eurasian Curlew Numenius arquata (NT), Far Eastern Curlew N. madagascariensis (EN) and Great Knot Calidris tenuirostris (EN)		
Key habitats (biomes)	Coastal intertidal flats and seagrass beds		
Key ecosystem services	Provisioning services, regulating services (e.g. storm hazard protection, flood protection), coastal protection services		
Key drivers of change	Expansion of settlements and housing infrastructure, recreation and tourism. Wetland restoration and management planning.		
Conservation status (mark all that applies)	☐ Protected Area	☐	Flyway Network Site
	☐ Ramsar Site	☐	Others _____
IBA/ KBA name (and number) and other designations	Olango Island		
Management Stakeholders	Olango Island PAMB, PENRO Cebu		
With management plan?	Yes		
Project concept themes	Wetland restoration and tourism		
Length of project	5 years		
Sector/s	Tourism		
No. of potential beneficiaries	Approximately 40,000 people		
Indigenous Peoples	☐ No	☐	Yes, _____
Anticipated Implementation Risks	Increased disturbance to wildlife, and increased solid waste pollution if tourist volumes to Olango Island increases, stability of the Philippine economy market		
Estimated Project Budget (US$)	4,700,000		
Potential Source/s of Financing	☐ Loan (to be identified)	☐	Private Sector
	☐ Grant (to be identified)	☐	Public-Private Partnership

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Abbreviations

ADB	Asian Development Bank
AWC	Asian Waterbird Census
BFAR	Bureau of Fisheries and Aquatic Resources
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 Organisation
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 Organisation
USAID	United States Agency for International Development
USD	United States Dollars

Executive Summary

Olango Island is located between Cebu and Bohol Islands, 4 km east of Mactan Island and 15 km east of Cebu City, Cebu Province. A low-lying island off the east coast of Mactan Island, with an extensive coralline intertidal sandflat to the south with some mangrove areas and seagrass beds offshore coral reefs and islands. The island is partly sheltered from the southeast monsoon and trade winds by Bohol and Mactan Islands but is open to the northwest monsoon and associated cyclonic storms. The extensive intertidal mudflats and mangrove forest on Olango Island are important feeding and roosting habitats for large congregations of waterbirds. It is one of the most important staging and non-breeding areas for migratory shorebirds in the Philippines, with over 10,000 individuals having been recorded there at one time, and the total number using the site estimated at up to 50,000, including species such as Asian Dowitcher *Limnodromus semipalmatus* (NT), Eurasian Curlew *Numenius arquata* (NT), Far Eastern Curlew *N. madagascariensis* (EN) and Great Knot *Calidris tenuirostris* (EN). Olango has received protection since the 1990s and has been recognised as a Ramsar site since 1994 but formally became designated as a wildlife sanctuary in 2018.

Surveys of Olango Island's stakeholders showed that provisioning services such as food provision (for seafood), is a major ecosystem services for local communities living near to, and around the site. As a result of its location, Olango also provides regulating services such as storm hazard regulation. A measure of Olango's contribution to reducing coastal risk as a proportion of population density showed that the site performed above the average against other coastal wetlands in the Philippines. Currently, Olango's wetland ecosystems are immediately impacted by the large population centres near the island (Mactan, Lapu-Lapu), which contributes solid waste pollution. Housing and the expansion of towns and cities is also expected to drive further wetland degradation, alongside recreational activities and tourism. On the other hand, it is useful to note that restoration activities have also increased mangrove coverage on Olango although this has come at the expense of the site's intertidal flats. Notwithstanding, the net increase in mangroves and seagrasses over time is expected to increase stored carbon (72,800 tonnes) and increase carbon sequestration.

Sustainable management of the Olango Island Wildlife Sanctuary is expected to involve continued mangrove restoration work but needs to be better planned and managed so that the mangrove cover does not come at the expense of other biodiversity-rich wetland ecosystems such as seagrass and intertidal flats. As a result of Olango's proximity to Cebu, ecotourism has been strongly advocated for by its management stakeholders. There are immediate opportunities to improve the livelihoods of local communities through expansion of tourism capacity but to do so there is need for targeted investments into building local capacities for (wetland) tourism, alongside investments to strengthen the limited, existing tourism infrastructure for visitors. The creation of a micro-finance mechanism for Olango's communities which are significantly impacted by Typhoon Odette could stimulate small-scale economic activities such as tourism and fishing. Last, and as a result of the site's importance to several migratory species, there is scope to develop a nature-based credit facility to generate financial returns for the local community and biodiversity protection, but the feasibility of this needs to be evaluated before an implementation work can take place.

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 prioritisation 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 prioritised 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 prioritised 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 Olango Island Wildlife Sanctuary

Location: Olango Island is located between Cebu and Bohol Islands, 4 km east of Mactan Island and 15 km east of Cebu City, Cebu Province. It is relatively accessible as it is close to Mactan-Cebu International Airport.

Area: The Olango Island RFI site has an area of 1,383 ha

Altitude: Sea-level.

Geographical coordinates: 10.25 N, 124.05 E

Description of site: A low-lying island off the east coast of Mactan Island, with an extensive coralline intertidal sandflat to the south with some mangrove areas and seagrass beds offshore coral reefs and islands. The island is partly sheltered from the southeast monsoon and trade winds by Bohol and Mactan Island but is open to the northwest monsoon and associated cyclonic storms. The principal vegetation is mangrove forest dominated by *Avicennia alba* along the seaward edge and in the accreting zone. *Rhizophora apiculata* is common along the edges of the forest, and there are some patches of *Sonneratia alba* and *Lumnitzera racemosa*. There are plantations of Coconut *Cocos nucifera* and a few small areas of agricultural crops in the interior of the island.

Site administration, management and land tenure: Olango Island Wildlife Sanctuary was declared in 1992 (area 920 ha), and the designation of the wildlife sanctuary was updated in 2018 (revised area of 1,382 ha). Olango Island was designated as a Ramsar site in 1994 (area 5,800 ha)[1]. A Protected Area Management Authority (PAMB) has been set up as the management authority for the wildlife sanctuary and a management plan is available and has been implemented. Most of Olango Island is state owned, but there are a few privately owned plots of land near some of the beaches. The island is under the jurisdiction of Lapu Lapu City, Province of Cebu.

Social and economic values: Olango Island has a small resident population, mostly of fishermen, and the waters around the island support an important fishery. The local people glean the tidal flats for sea urchins and ornamental shells (in high demand as nearby Cebu is a major tourist destination), and coral is gathered for export despite this being illegal. This intensive exploitation, together with offshore dynamite and cyanide fishing, is putting heavy pressure on the coastal resources. The main crops grown on Olango are cassava, corn, camote, banana, and green vegetables. The water supply from public wells is not sufficient for the daily needs of the people, and many are forced to drink brackish water. The mangroves on the island are cut to provide firewood for domestic use, and the mangrove trees are generally low-growing and scrubby because of this continuous cutting. Some areas have been replanted with mangroves, and there are government schemes for further replanting, although there is a risk that this will replace areas of tidal flats that are used by foraging shorebirds. Olango Island is sometimes visited by organized groups of hunters from other regions of the Philippines, who target the waterbirds that visit the island.

[1] Ramsar Site Information Sheet: *Olango Island Wildlife Sanctuary.* Available at https://rsis.ramsar.org/ris/656

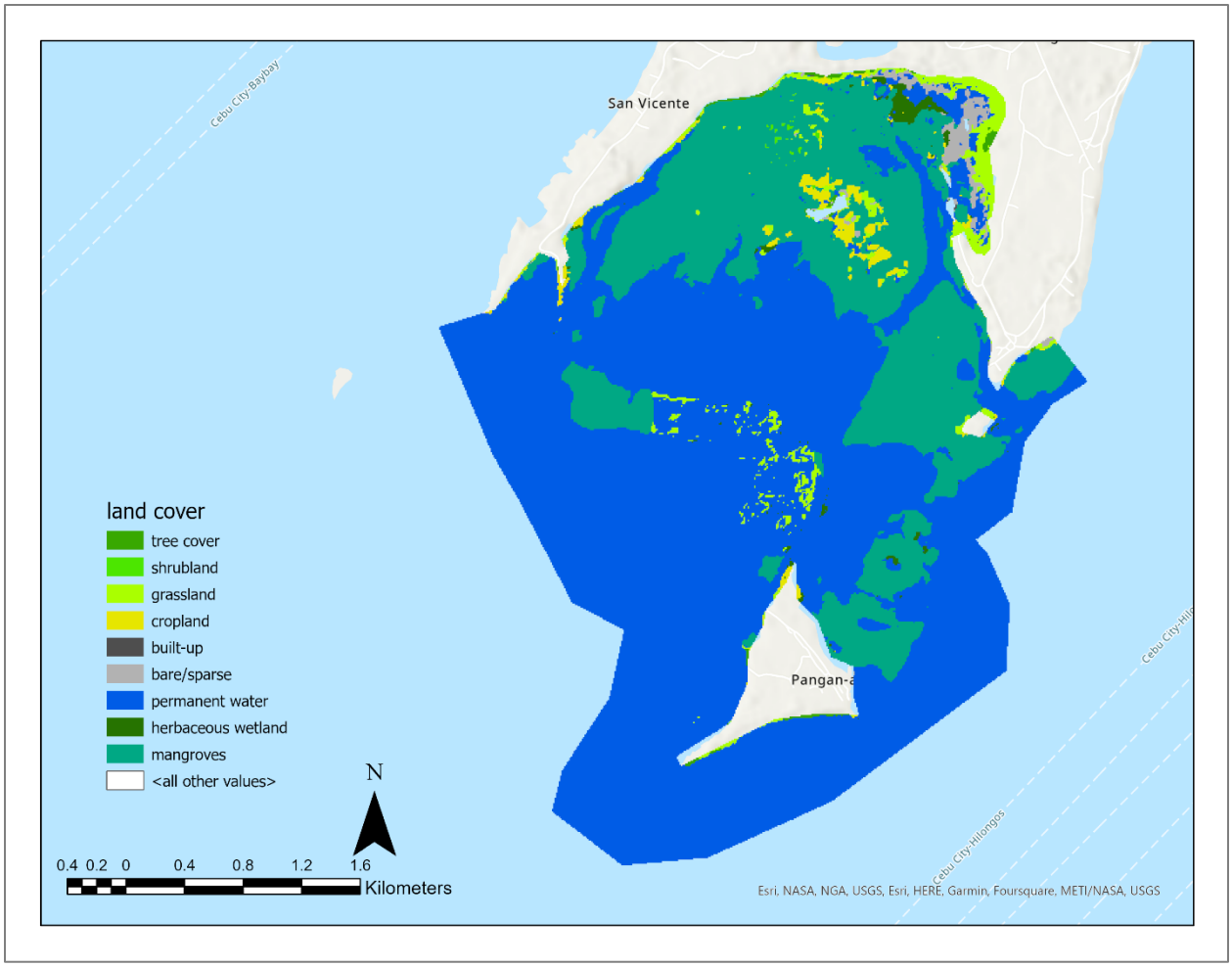

Figure 1 Map showing the full extent of the Olango Island Wildlife Sanctuary in the Visayas (Map: Radhika Bhargava)

3. Biodiversity value of Olango Island Wildlife Sanctuary

3.1 Key habitats

Olango Island is a low-lying island off the east coast of Mactan Island, with an extensive coralline intertidal sandflat to the south, with some mangrove areas and seagrass beds, offshore coral reefs and islands. The principal vegetation is mangrove forest dominated by *Avicennia alba* along the seaward edge and in the accreting zone. *Rhizophora apiculata* is common along the edges of the forest, and there are some patches of *Sonneratia alba* and *Lumnitzera racemosa*. There are plantations of Coconut *Cocos nucifera* and a few small areas of agricultural crops in the interior of the island.

3.2 Importance of Olango Island Wildlife Sanctuary to migratory waterbird species

The extensive intertidal mudflats and mangrove forest on Olango Island are important feeding and roosing habitats for large congregations of waterbirds. It is one of the most important staging and non-breeding areas for migratory shorebirds in the Philippines, with over 10,000 individuals having been recorded there at one time, and the total number using the site estimated at up to 50,000.

Waterbird count data from the 2019, 2020 and 2021 Asian Waterbird Census was used in the RFI priority sites analysis for Olango Island. For each species, the 2019, 2020 and 2021 counts were averaged and then compared to the CSR1 1% population estimates to calculate a score for each species. The seven species in Table 1 were found to exceed the 1% population estimates, and the scores for these species were summed to produce the overall site score for Olango Island.

Table 1 List of migratory species (based on the EAAFP list of species) with globally significant congregations in Olango Island (note recent taxonomic change in the Lesser Sandplover, which now is recognised as at least two species)

Scientific name	IUCN	Average count	CSR1	CSR1 score
Lesser Sandplover *Charadrius mongolus*	LC	3,530	300	11.8
Common Tern *Sterna hirundo*	LC	2,745	460	6.0
Grey-tailed Tattler *Tringa brevipes*	NT	1,213	700	1.7
Ruddy Turnstone *Arenaria interpres*	LC	436	300	1.5
Kentish Plover *Charadrius alexandrinus*	LC	982	700	1.4
Whimbrel *Numenius phaeopus*	LC	854	650	1.3
Red-necked Stint *Calidris ruficollis*	NT	4,833	4,800	1.0

Olango Island supports important populations of several globally threatened and near-threatened waterbird species, including the migratory Curlew Sandpiper *Calidris ferruginea* (NT), Asian Dowitcher *Limnodromus semipalmatus* (NT), Bar-tailed Godwit *Limosa lapponica* (NT), Eurasian Curlew *Numenius arquata* (NT), Far Eastern Curlew *N. madagascariensis* (EN), Great Knot *Calidris tenuirostris* (EN) and Red Knot *C. canutus* (NT), and the non-migratory Philippine Duck *Anas luzonica* (VU).[2]

[2] Ramsar Site Information Sheet: *Olango Island Wildlife Sanctuary.* Available at https://rsis.ramsar.org/ris/656

3.3 Other notable biodiversity

The Ramsar Site Information Sheet indicated that Olango Island has 27 mangrove and mangrove associated species with Rhizophora mucrenata as the dominant species followed by Avicennia alba and Sonneratia caseolaris.[3] Osbornia ectodonta is the most common at the waterbird roosting site interspersed with Lumnitzera littorea and Lumnitzera racemosa.

4. Ecosystem services

4.1. Ecosystem services provided by Olango Island Wildlife Sanctuary

The Olango Island Wildlife Sanctuary encompasses diverse habitats that provide valuable provisioning, regulating, and cultural ecosystem services (Figure 2). The results from the RFI workshop[4] held in the Philippines highlight the top ecosystem services provided by the site, emphasising their essential and non-substitutable nature (Table 2). Provisioning services, particularly food provision, benefit communities both within, adjacent to, and distant from the site. Regulating services such as flood hazard regulation, storm hazard regulation, and water purification are crucial, mainly benefiting local and adjacent communities. Cultural services, particularly recreation and ecotourism, significantly benefit communities at all distances.

[3] Ramsar Site Information Sheet: *Olango Island Wildlife Sanctuary.* Available at https://rsis.ramsar.org/ris/656

[4] 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

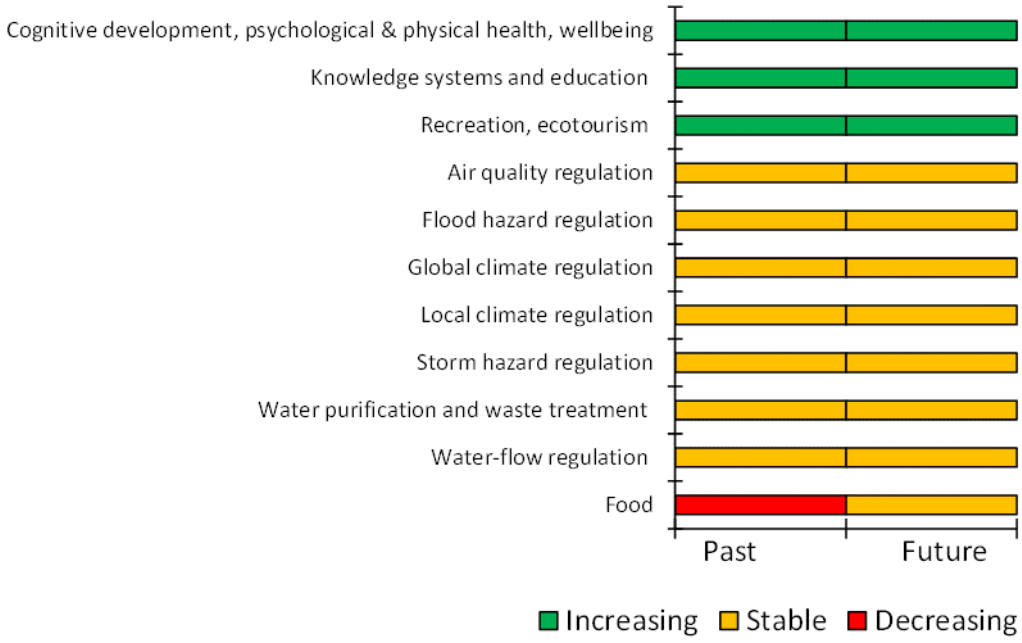

Figure 2 List of ecosystem services provided by Olango Island Wildlife Sanctuary, as identified through stakeholder consultation at the Regional Flyway Initiative workshop.

Table 2 List of top ecosystem services provided by Olango Island Wildlife Sanctuary.

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	✓	✓	✓	Decrease	No change
Regulating services						
Flood hazard regulation		✓	✓		No change	No change
Storm hazard regulation		✓	✓		No change	No change
Water purification and waste treatment	Yes	✓			No change	No change
Cultural services						
Recreation, ecotourism	Yes	✓	✓	✓	Increase	Increase

4.2. Global climate regulating services

Based on systematic reviews (Chen and Lee, 2022; Stankovic et al., 2023), the amount of carbon stored in Olango Island Wildlife Sanctuary is estimated to range from 50,000 to 651,000 tonnes, while the annual carbon sequestration rate is estimated to be between 715 and 3,900 tonnes per year.

4.3. Coastal protection services

The coastal protection services provided by Olango Island Wildlife Sanctuary (WS) 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), Olango Island WS shows consistent results in terms of risk level:

(1) for the potential exposure to coastal hazards, Olango Island WS is above average compared to both RFI coastal sites (index: 2.77 vs. 2.70) and all other coastal areas (index: 2.77 vs. 2.36);

(2) for the contribution to reducing coastal risk as a proportion of population density within 2.5 km of the coast, Olango Island WS is also above the average of both RFI coastal sites (496 vs. 306 people/ha) and all other coastal sites (496 vs. 122 people/ha); and

(3) for the contribution to reducing coastal risk as a percentage of the maximum potential exposure, Olango Island WS is again above average compared to both RFI coastal sites (7.67% vs. 5.28%) and all other coastal areas (7.67% vs. 6.60%).

In monetary terms (Table A4 in Annex 1), Olango Island WS cannot unfortunately be compared to the average risk levels of either the nine RFI coastal sites or of all other coastal areas in the Philippines because no data were available for this site due to the lack of mangrove area to be modelled.

5. Drivers of change and their potential impacts on Olango Island Wildlife Sanctuary

5.1. Current drivers of change and their level of impact

Stakeholders at the RFI workshop[5] identified 11 drivers of change impacting the Olango Wetland and their corresponding level of impact on the wetland site (Table 3). High-impact drivers include garbage and solid waste, which pose substantial threats to the wetland's ecosystem by degrading water quality and harming wildlife. Housing and settlement developments nearby contribute further to habitat degradation, affecting the site's ecological integrity. Recreational activities, tourism, and the associated infrastructure also have a high impact, leading to habitat disturbance and environmental stress. However, restoration for conservation is noted as a high impact, suggesting that there are current efforts to restore the wetland back to its natural state. Medium-impact drivers include research, education, and other work-related activities, which can modify the site moderately by introducing positive changes to the habitat management.

Table 3 Drivers of change and their potential impact on the integrity of Olango Island Wildlife Sanctuary based on consultations with stakeholders.

Driver of change	Impact
Garbage and solid waste	High
Housing and settlement	
Recreational activities and tourism	
Restoration for conservation	
Tourism and recreation infrastructure	
Research, education and other work-related activities	Medium
Activities of site managers	Low
Fishing, killing and harvesting of aquatic resources	
Increased fragmentation within the wetland site	
Logging and timber harvesting	
Marine and freshwater aquaculture	

[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

5.2. Potential alternative state of Olango Island Wildlife Sanctuary under current drivers of change

Stakeholders at the RFI workshop[6] 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.

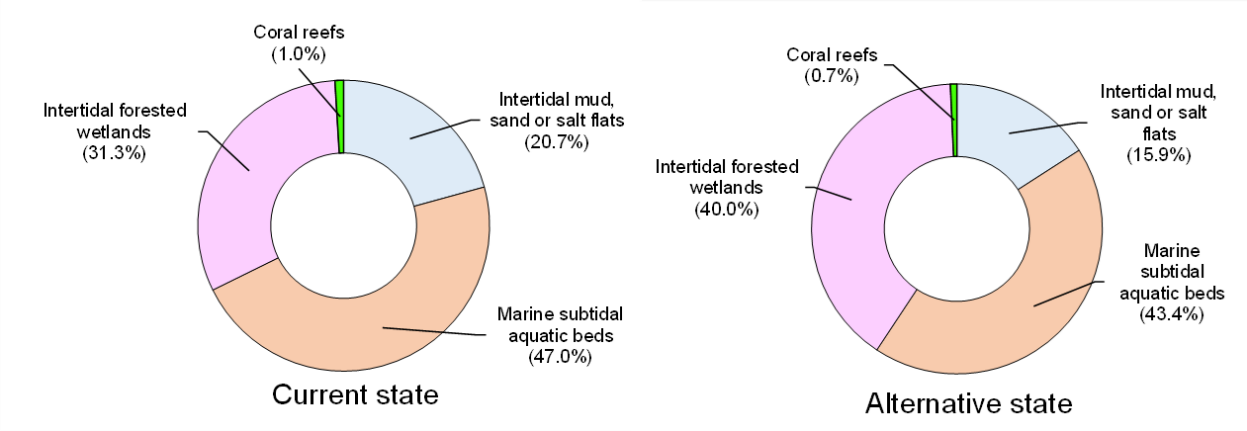

Figure 3 The proportional change in the extent of different habitat types between the current and alternative states of Olango Island Wildlife Sanctuary.

5.3. Expected changes in the ecosystem services of Olango Island Wildlife Sanctuary

Stakeholders at the RFI workshop[7] documented the future trends in the provision of ecosystem services in Olango Island Wildlife Sanctuary, 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 there was a decrease in food provision in the past, but it is expected to remain unchanged in the future. Regulating services such as flood hazard regulation, storm hazard

[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

[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

regulation, and water purification have shown no change in both past and future contexts, indicating stability in their provision over time. Cultural services, particularly recreation and ecotourism, have seen an increase in the past and is expected to continue increasing in the future.

In the alternative state, the gain of 28% of mangrove and the loss 23% of intertidal mudflat, as well as 8% of seagrasses are expected to result in an increase of stored carbon estimated at 72.800 tonnes and an increased carbon sequestration (carbon accumulation) estimated approximately from 1 to 882 tonnes per year.

A gain of 116.5 ha of mangroves and coral reefs as presented in Table A is equivalent to 8% of the total land use for the site, which is expected to result in roughly a 0.65% increase in coastal protection. This may amount to a contribution to reducing coastal risk of 0.05% as a percentage of the maximum potential exposure (based on a current percentage of 7.67%) and slightly more than 3 more people/ha as a proportion of population density within 2.5 km of the coast (from 496 people/ha).

6. Capacity needs in Olango Island Wildlife Sanctuary

The stakeholder consultation and analyses with stakeholders representing government and civil society identified at least 5 major stakeholder groups with clear roles in the long-term sustainable management of Olango Island Wildlife Sanctuary. Current roles and opportunities to build local capacity in wetland management are summarized in Table 4.

Table 4 Capacity needs for improved management of Olango Island Wildlife Sanctuary, identified at the stakeholder level.

Stakeholder	**Current Role in wetland management**	**Future role (alt state)**	**Current capacity**	**Future capacity (alt state)**	**Form of capacity development**
Local communities	Wetland users (harvesting seafood and NTFPs)	Stewards/volunteers/citizen scientists	General knowledge on wetland ecosystem	In depth CEPA and capacity building activities related to wetland conservation	Training on fauna/flora identification and data gathering, to build capacity for monitoring
Local Government Unit	PAMB member/legislative/policy making	Spearhead wetland conservation activities, funded by their LRA	General knowledge on wetland laws, rules and regulations	Natural resource management	Benchmarking activities from other wetlands/sharing and learning of best practices Natural resource accounting/economic valuation training
Research institutions	conducts research (thesis and/or funded projects)	Lead CEPA activities& translate research outputs into knowledge products to be used by the community. Become a member of PAMB			Contribute to capacity building at the site level.
Private sector/business/tour operators	Provide services to tourists	Help promote ecotourism. Become member of PAMB	Basic skills on tourist/tourism management	Tourism promotion/ marketing for wetland conservation	Branding of ecotourism products related to wetland conservation
Conservation organisations	Provide technical assistance	Become PAMB member			

7. Opportunities for RFI interventions

7.1 Recommended Interventions

Olango Island protects some of the most important areas of coastal wetlands for migratory waterbirds in the Visayan region, and its proximity to Cebu provides good access for domestic tourists. Extensive damages suffered by Olango Island during Typhoon Odette (in 2022)[8,9] and its impact on local communities demonstrate the highly climate-vulnerable communities. Since then, mangrove restoration work undertaken by various agencies has already restored some degraded areas of mangroves, but there are further opportunities for upscaling to other degraded parts of the Olango coastline.

Table 5 Key interventions recommended for the sustainable management of the Olango Island Wildlife Sanctuary.

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
Component 1. Enhancement of wetland-based ecotourism					
Develop and integrate wetland-based ecotourism framework into the Olango Island Wildlife Sanctuary (OIWS) site management plan, including a financing mechanism	Cohesive and inclusive wetland-based tourism framework for OIWS Integration of the OIWS wetland-based tourism framework into the site management plan Wetland-based tourism strategy and plan developed with inputs from key stakeholders	Feasibility studies related to wetland-based tourism completed. One wetland-based tourism plan developed for Manila Bay and disseminated to key stakeholders Updated OIWS site management plan, with the integration of the wetland-based ecotourism framework and financing mechanisms Number of stakeholders	100,000.00	1 year	DENR PENRO Cebu concerned LGUs Olango Island PAMB Conservation organisations (including bird and community-focused NGOs, such as PhilBio) Department of Tourism

[8] https://eaaflyway.net/typhoon-odette/
[9] https://www.gmanetwork.com/news/scitech/science/816203/odette-smashed-delicate-island-bird-sanctuary-in-cebu/story/

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
		engaged for the development of the wetland -based tourism framework for OIWS			local communities
Build the capacity of local communities on wetland-based tourism	Training and capacity needs for wetland-based tourism assessed Relevant training modules developed and implemented with key stakeholders (e.g., DENR, LGUs, provincial government, DoT, tourism operators) Improved capacity of key stakeholders about wetland-based tourism	Training Needs Assessment on wetland-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 local communities (target of two communities) benefitting from the capacity-building activities	100,000.00	5 years	
Improve ecotourism infrastructure including viewing platforms, shelters, boardwalks, and signage	Stronger (and functional) infrastructure to host tourists, including platforms, boardwalks, and signage in least sensitive areas	Scoping map for appropriate areas for wetland-based tourism development created and presented to key stakeholders Number of	500,000.00	3 years	

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
		infrastructure established/ improved (i.e., at least 0.5 km boardwalks and hides) constructed			
Component 2. Improvement of local livelihoods through microfinance mechanisms					
Strengthen financing instruments, including through microfinance for tourism operators (including boat owners, local guides) and small-scale fisherfolk	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 to at least 2 barangays. Number of small loans for fisherfolk disbursed.	200,000.00	5 years	BFAR concerned LGUs Existing cooperatives Conservation organizations Olango PAMB
Build institutional capacity for small-scale fisheries through strengthening cooperatives.	Improved capacity for sustainable fishing practices of local communities Training and capacity needs	Training Needs Assessment on sustainable fishing practices completed and disseminated to concerned stakeholders Number of training	100,000.00	5 years	

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
	for fisherfolk 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	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 3. Restoration of degraded (and damaged) wetlands					
Expand mangrove restoration plots at degraded and highly damaged areas of mangroves on Olango Island	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 100 ha at identified plots One nursery established for mangrove restoration efforts in OIWS A locally led group tasked for monitoring mangrove restoration efforts	100,000.00	5 years	DENR Provincial Government PENRO Cebu concerned LGUs local communities Conservation organisations

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
Component 4. Biodiversity credits as long-term investment for conservation					
Assess the feasibility of a biodiversity credit project focused on migratory species	Feasibility of a biodiversity credit scheme, and other potential financing mechanisms assessed. Public and private financing mechanisms identified to sustain interventions for OIWS Biodiversity credit scheme implementation plan is developed for OIWS, if seen applicable.	Feasibility of a biodiversity credit scheme, with focus on migratory species, has been assessed and presented to key stakeholders, particularly those involved in policy-making Number of stakeholders engaged for the assessment of the biodiversity credit scheme applicability Biodiversity credit scheme implementation plan developed, if seen applicable by key stakeholders	100,000.00	1 year	DENR PENRO Cebu concerned LGUs Olango Island PAMB Private companies Conservation organizations research institutions
Pilot the biodiversity credit scheme mechanism for nature-based credits for Olango Island (and other portfolio of RFI wetland sites)	Biodiversity credit scheme mechanism is tested with key stakeholders for OIWS and further asssessed on its applicability to the RFI wetland sites. Working group for nature-based credits has been created with key stakeholders	Documentation of the pilot implementation of the biodiversity credit scheme mechanism developed with key stakeholders Number of stakeholders engaged for the pilot implementation A locally led working group for nature-based credits created	250,000.00	2 years	

Intervention	Outcome	Indicators	Cost	Timeframe	Potential Stakeholders
		A list of potential private partners for the pilot of the biodiversity credit scheme mechanism in OICS.			
Total investment for five years			**4,700,000**		

7.2 Potential Financing

The estimated project cost is USD 4,700,000 for five years. This project budget supports the strengthening of local wetland-based tourism, the restoration of degraded wetland areas, strengthening microfinancing mechanisms with local communities, and the pilot of the biodiversity credit scheme mechanism in the Olango Island Wildlife Sanctuary.

7.3 Proposed Institutional Arrangements

The proposed project for Olango Island is expected to span five years.

7.4 Project Beneficiaries

Based on the Typhoon Odette impact news coverage[10], there are 40,000 people in Olango, which can be safely assumed as benefitting from its ecosystem services.

7.5 Anticipated Implementation Risks

Environment: Wetland-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 the OIWS. Building these infrastructures, however, would induce noise that may disturb the wildlife in the area. Planning with stakeholders is critical before any infrastructure development.

[10] https://www.gmanetwork.com/news/scitech/science/816203/odette-smashed-delicate-island-bird-sanctuary-in-cebu/story/

Poorly planned establishment of mangrove plantings may lead to loss of foraging habitat for some waterbirds and is a known issue in many parts of the Philippines where coastal restoration is being implemented. Evidence-based scoping needs to be carried out to identify key restoration plots.

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 mangroves is not impacted by proposed development.

Financial: Assessing and piloting innovative financing mechanisms, particularly biodiversity credits, has been identified as a project concept theme. Carbon financing guidelines have not been finalized in the Philippines, but nature credits via voluntary markets are already in place and being implemented increasingly in the country. Macroeconomic conditions may impact on the sustainable financing component. Currently, the Philippine economy is quite unstable in the global markets due to current political-related events, which makes the risk moderate.

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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 Olango Island WS 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)	1,924 – 2,748
Current maximum coastal risk to be mitigated, or potential exposure to coastal hazards (unitless index)	*2.68 – 2.86*
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)	3.22 – 3.43
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)	3.38 – 3.60
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)	3.50 – 3.74
Current proportional risk reduction, nature's contribution to reducing coastal risk as a proportion of maximum coastal risk (unitless index)	0.21 – 0.21
Nature's contribution to reducing coastal risk as a proportion of population density within 2.5 km of the coast (# of people per hectare)	*408 – 583*
Nature's contribution to reducing coastal risk as a percentage of the maximum potential exposure (%)	*0.07 – 0.08*

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 Olango Island WS 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$)**
Mangrove extent (hectares)[2]	(526) – 526
Annual expected flood protection benefits to people (number of people)	No Data
Annual expected flood protection benefits to Industrial Stock (US$)	No Data
Annual expected flood protection benefits to Residential Stock (US$)	No Data
Annual expected flood protection benefits to Total Stock (US$)	No Data
Annual expected flood protection benefits to Industrial Stock per hectare of mangroves (US$ per hectare)	*No Data*
1-in-100-year return period damage in terms of area flooded (number of hectares)	No Data
Total expected flood protection benefits of mangroves per 100-year return period storms (US$)	*No Data*

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
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)
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 Olango Island Wildlife Sanctuary 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 (%)
Intertidal mud, sand or salt flats	286.5	20.7	219.6	15.9
Marine subtidal aquatic beds	649.8	47.0	600.3	43.4
Intertidal forested wetlands	433.3	31.3	553.1	40.0
Coral reefs	13.3	1.0	10.0	0.7
Total	1382.9	100.0	1382.9	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.