ADB

Regional Flyway Initiative · Site Study

May 2026

RFI Priority Site · Agusan Marsh Wildlife Sanctuary

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Asian Development Bank

General Site Information

Country	Philippines			
RFI Site Name	Agusan Marsh Wildlife Sanctuary			ID121
City/ Municipality, Province, Region	Municipalities of San Francisco, Bunawan, Veruela, Loreto, Talacogon, Lapaz, and Sta. Josefa, Agusan del Sur			
Geographical coordinates	8.31º N, 125.90º E		Area (has)	40,870 ha
Key species	Several species of migratory (and resident) egrets. Philippine and Estuarine crocodiles. Southern Philippine Hawk-eagle, Southern Silvery Kingfisher			
Key habitats (biomes)	Floodplain wetlands and swamp forests			
Key ecosystem services	Provisioning services			
Key drivers of change	Illegal agricultural activities, logging and mining, invasive species. Unmanaged fisheries			
Conservation status (mark all that applies)	■	Protected Area		Flyway Network Site
	■	Ramsar Site		Others _____
IBA/ KBA name (and number) and other designations	Agusan Marsh			
Management Stakeholders	Agusan Marsh Wildlife Sanctuary PAMB, PENRO Agusan del Sur, Peoples Organisations (PO)			
With management plan?	Yes			
Project concept themes	Wetland restoration, fisheries, tourism			
Length of project	At least 8 years			
Sector/s	Fishery, tourism, biodiversity (wetland) management			
No. of potential beneficiaries				
Indigenous Peoples		No	■	Yes, Manobo people
Anticipated Implementation Risks	Conflicts with local communities as a result of increased enforcement. Reduced incomes from fisheries. Siltation of areas with infrastructure construction.			
Estimated Project Budget (US$)	17,800,000 over 8 years			
Potential Source/s of Financing	■	Loan (to be identified)	■	Private Sector (to be identified)
	■	Grant (to be identified)		Public-Private Partnership

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Abbreviations

ADB	Asian Development Bank
AHP	ASEAN Heritage Park
AMWS	Agusan Marsh Wildlife Sanctuary
AWC	Asian Waterbird Census
BFAR	Bureau of fisheries and aquatic resources
CEPA	Communications, education and public awareness
CSR	Conservation Status Review
DMC	Developing Member Country
EAAFP	East Asian-Australasian Flyway Partnership
ECA	Ecologically Critical Area
IBA	Important Bird and Biodiversity Area
KBA	Key Biodiversity Area
LGU	Local Government Unit
MDA	Mindanao Development Authority
NGO	Non-governmental Organisation
PENRO	Provincial environment and natural resources office
PES	Payment for ecosystem services
PO	Peoples' organisation
PFO	Provincial fishery office
RFI	Regional Flyway Initiative
SLR	Sea Level Rise
TESSA	Toolkit for Ecosystem Services Assessment
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USD	United States Dollars

Executive Summary

The Agusan Marsh Wildlife Sanctuary protects a vast complex of freshwater marshes and watercourses with numerous small shallow lakes and ponds in the upper basin of the Agusan River, northeast Mindanao, and is among the largest inland wetlands in the Philippines. The marshes are typically inundated from November to March during the monsoons and attract large congregations of migratory waterbirds. The wetlands of the Agusan provide an important source of water for irrigation in the surrounding agricultural landscapes, downstream to the city of Butuan and performs an important hydrological function by retaining large amounts of water during the rainy season. The Agusan Marsh is recognised for its large congregations of waterbird species dependent on freshwater wetlands, notably egrets and herons, and has at least one species with congregations significant at the flyway level, the Intermediate Egret. Agusan Marsh Wildlife Sanctuary was gazetted in 1996, and its designation was updated in 2018 under the NIPAS; its management is overseen by its PAMB. The main economic activities in the marsh are fishing, small-scale aquaculture and agriculture. The Agusan region is sparsely populated because of the annual flooding of the Agusan River, but there are significant communities of Manobo people living within the wetlands, as well as settlers from surrounding regions.

The Agusan Marsh Wildlife Sanctuary provides critical ecosystem services to the communities living within and downstream of the marshes in Agusan del Norte. They include the provisioning of food (through its fisheries, and various NTFPs), as well as regulating services in the form of flood hazard regulation and water purification. Existing studies also show high carbon storage at some parts of marsh covered by peatlands, with aboveground carbon estimates varying from 1.29 to 37.2 Mg C ha^{-1}. The site however faces many threats: agricultural and forestry effluents from logging activities in the Agusan River watershed, a major timber-harvesting landscape in Mindanao, pose a significant threat alongside agricultural encroachment by settlers within the site. (Unmanaged) fishing, killing, and harvesting of aquatic resources represent another high-impact activity, threatening the biodiversity within the sanctuary.

To improve management and conservation of the Agusan Marsh Wildlife Sanctuary, there is considerable scope for improving watershed management in the entire Agusan River Basin, in collaboration with the site authorities and people organisations. There are clear avenues for, (1) tourism development with a focus on wetland-based tourism, through the creation of new infrastructure such as jetties, substations and strengthening the capacity of the few tourism operators that exists (tourism is very small scale now, due to accessibility issues), (2) establishment of a payment for ecosystem services (PES) scheme for the Agusan River Basin to generate revenue for (upstream) wetland management and protection, (3) wetland restoration and invasive species management, and (4) improving fishery management. Stakeholder consultations and site visits have shown invasive plants such as the water hyacinth to be a major problem, impacting biodiversity and natural climax wetlands, alongside various invasive catfish of South American origin that is expected to affect fishery production. There is an urgent need to address invasive vegetation, and this may involve targeted clearance of mats of water hyacinth, alongside regular monitoring activities. Targeted restoration of disused land parcels cleared for agriculture into marshland and woodland could benefit biodiversity and fisheries.

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 selection 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 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 effectively 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 Agusan Marsh Wildlife Sanctuary

Location: Agusan Marsh is located near Bunawan in Agusan del Sur Province, in the interior of north-eastern Mindanao. It extends from Lake Lumao near Talacogon in the north to Viruela in the South.

Area: The Agusan Marsh RFI site has an area of 40,870 ha, but the whole landscape spans in excess of 100,000 ha.

Altitude: 55 m asl.

Geographical coordinates: 8.31º N, 125.90º E

Description of site: Agusan Marsh is a vast complex of freshwater marshes and watercourses with numerous small shallow lakes and ponds in the upper basin of the Agusan River and its tributaries. The rivers rise in the hills of eastern Mindanao and cause extensive flooding in the marshes from November to March. The marsh is an important source of water for irrigation, and it has an important hydrological function, holding excess water at times of high flow, and ensuring adequate flow during dry periods.

Site administration, management and land tenure: Agusan Marsh is state owned public land and is classified as timberland. Agusan Marsh Wildlife Sanctuary was declared in October 1996, and the designation was updated in 2018; the site became recognised as a Ramsar Wetland in 1999. The marsh is a protected area under NIPAS (1994), Presidential Proclamation 913 (1996). A Protected Area Management Board (PAMB) has been established as the Management Authority for the wildlife sanctuary.

Social and economic values: The main economic activities in the marsh are fishing, aquaculture and agriculture, but the region is sparsely populated because of the annual flooding of the Agusan River. The major methods of fishing are, (1) hook in line, (2) gill net, (3) spear, (4) electric fishing, and some parts of the wetland have been converted into fishponds. Agriculture is mainly confined to the raised riverbanks during the dry season. Corn is the most important crop, followed by bananas and coconuts, and rice is the major crop around the periphery of the marsh. The major rivers are the main arteries of transportation throughout the area, with motorised pump boats used to carry passengers, and the Agusan River used for floating logs from the upper catchment down to Butuan City. Agusan Marsh is home to the Manobo indigenous people who are found inside the swamp in the western side. The Manobos comprise 60% of the total population while an estimated 40% are settler migrants, such as Cebuanos and Ilongos. The population includes: (i) people who reside permanently in floating houses in Agusan Marsh, mainly around the major rivers; (ii) people who live in Agusan Marsh only during the dry period and move out to the periphery during the flood season; and (iii) people who live permanently on the periphery of the marsh and move into the marsh on a daily basis. The unique marsh environment provides ecotourism and educational opportunities, and motorboats and canoes are available for hire in Bunawan.

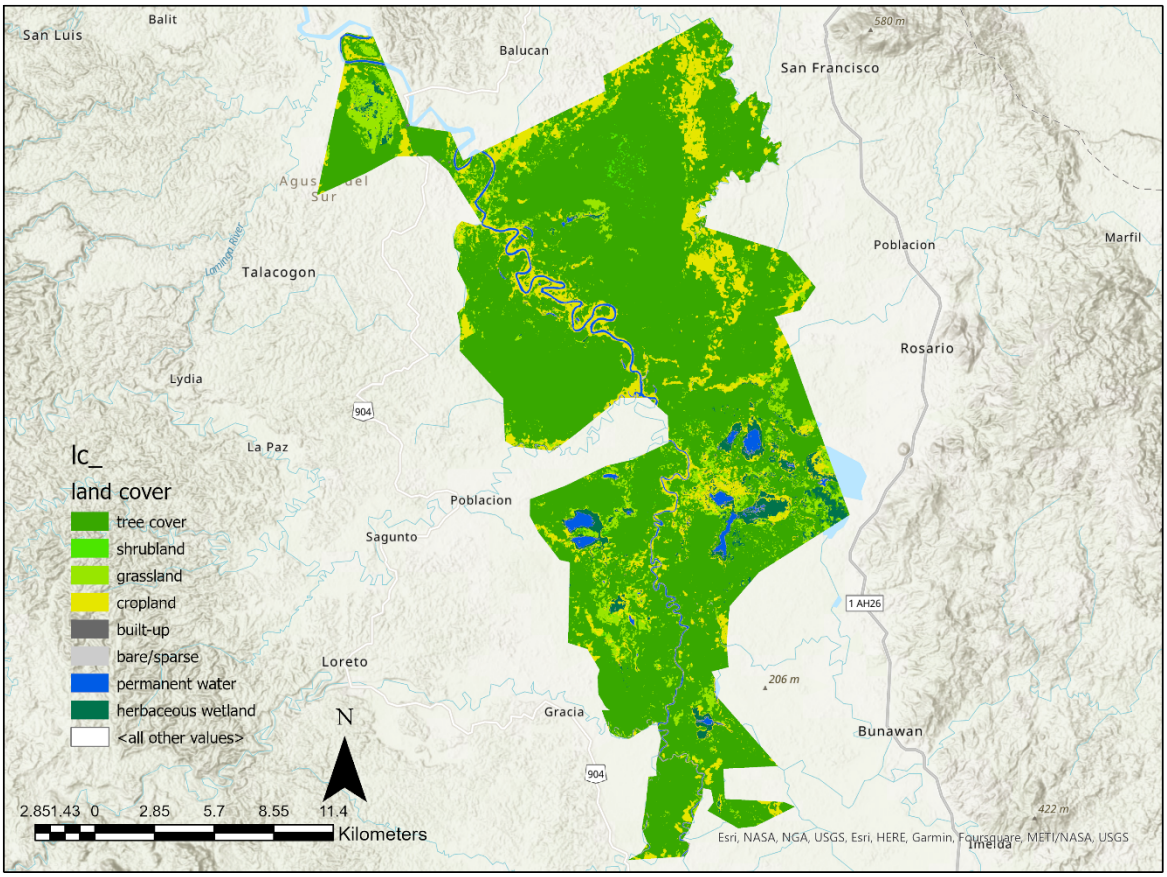

Figure 1 Land cover map of the Agusan Marsh Wildlife Sanctuary with the Agusan River bisecting the site. Agusan Marsh is among the largest freshwater wetlands in Mindanao, the other being Liguasan Marsh in Lanao del Sur. (Map: Radhika Bhargava).

3. Biodiversity value of Agusan Marsh Wildlife Sanctuary

3.1. Key habitats

Agusan Marsh is a vast complex of freshwater marshes and watercourses with numerous small shallow lakes and ponds in the upper basin of the Agusan River and its tributaries. The rivers rise in the hills of eastern Mindanao and cause extensive flooding in the marshes from November to March.

3.2. Importance of Agusan Marsh to migratory waterbirds

The marshes and swamp forests of Agusan Marsh Wildlife Sanctuary are important for waterbird species dependent on freshwater wetlands, notably egrets and herons, rails and to a smaller extent, shorebirds. Waterbird count data from the 2019, 2020 and 2021 Asian Waterbird Census was used in the RFI priority sites 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. Only the Intermediate Egret exceeded the 1% population estimates (and the score for this species provided the overall score for this site) based on the available data (Table 1), but it is likely that the numbers of many waterbird species were under-estimated by the AWC given the inaccessibility of large parts of this wetland.

Table 1 List of migratory species (based on the EAAFP list of species) with globally significant congregations in Agusan Marsh Wildlife Sanctuary, based on AWC count data.

Scientific name	IUCN	Average count	CSR1	CSR1 score
Intermediate Egret *Ardea intermedia*	LC	6,891	1,000	6.9

Agusan also supports a nationally important population of the non-migratory Philippine Duck *Anas luzonica* (VU), and formerly, Eastern Sarus Crane *Grus antigone sharpii,* now extinct in the Philippines. The species was last recorded in Agusan Marsh in 1965.

In total, 127 bird species have been reported (Baclayo et al. 2020). Several globally threatened forest-dependent species are also known from the mosaic of forests in and around Agusan Marsh, including Spotted Imperial-pigeon *Ducula carola* (VU), South Philippine Hawk-eagle *Nisaetus pinskeri* (EN), Rufous-lored Kingfisher *Todiramphus winchelli* (VU) and Celestial Monarch *Hypothymis coelestis* (VU), but it is unclear whether the remaining swamp forests support significant populations of these species.

3.3. Other notable biodiversity

Agusan Marsh supports the largest population of Estuarine Crocodile *Crocodylus porosus* remaining in the Philippines, and the globally threatened and endemic Philippine Crocodile *C. mindorensis* (CR) may also be present although there are very few records. Butterfly species of conservation concern recorded here includes the threatened *Graphium idaeoides* (VU).

4. Ecosystem Services

4.1. Ecosystem services provided by the Agusan Marsh Wildlife Sanctuary

The Agusan Marsh Wildlife Sanctuary provides various ecosystem services that are crucial for the surrounding environment and communities (Figure 2). The results from the RFI workshop[1] in the Philippines highlight the top ecosystem services provided by the site, emphasising their essential and non-substitutable nature (Table 2). Provisioning services, such as fresh water and food, offer significant benefits to communities located within, adjacent to, and distant from the sanctuary. Regulating services, including water-flow regulation, flood hazard regulation, and water purification and waste treatment, all key services provided by freshwater wetland systems such as Agusan, are also vital for these communities at all distances.

[1] 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

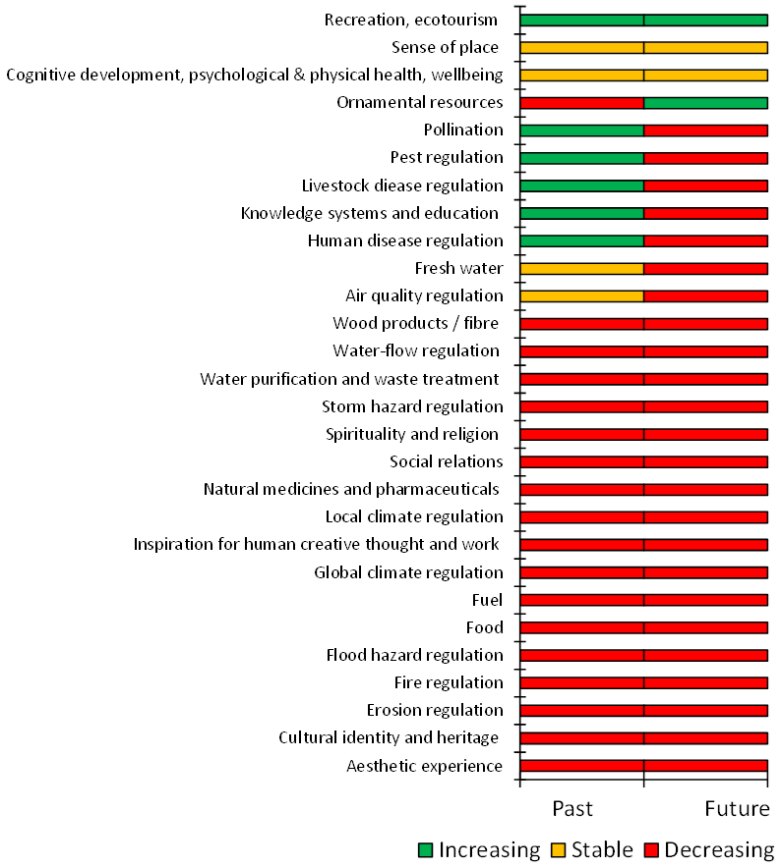

Figure 2 List of ecosystem services provided by Agusan Marsh Wildlife Sanctuary, as identified through stakeholder consultation at the Regional Flyway Initiative workshop.

Table 2 List of top ecosystem services provided by Agusan Marsh 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						
Fresh water	Yes	✓	✓	✓	No change	Decrease
Food	Yes	✓	✓	✓	Decrease	Decrease
Regulating services						
Water-flow regulation	Yes	✓	✓	✓	Decrease	Decrease
Flood hazard regulation	Yes	✓	✓	✓	Decrease	Decrease
Water purification and waste treatment	Yes	✓	✓	✓	Decrease	Decrease

4.2. Global climate regulating services

Existing studies estimating carbon sequestration just for peatlands within the Agusan Marsh alone showed that aboveground carbon varied from 1.29 Mg C ha^{-1} to 37.2 Mg C ha^{-1} (Orella et al. 2022).

4.3. Flood mitigation services

The flood mitigation services provided by Agusan Marsh Wildlife Sanctuary (WS) were assessed using biophysical values only (see Table A1 and Annex 1 for details). When compared to both the average of the three RFI inland sites and the average of all other inland wetlands in the Philippines (Table A2 in Annex 1), Agusan Marsh WS shows some mixed results in terms of benefits and beneficiaries:

(1) for the average green storage capacity per sq. km of wetland, Agusan Marsh WS is consistently above average (967 Giga Litres or GL of water per km^2 vs. 562 GL/km2 for RFI inland sites and 448 GL/km^2 for all other inland wetlands);

(2) for the average population uniquely benefitting from influential green storage upstream per sq. km of wetland, Agusan Marsh WS is above the average of RFI inland sites (186 vs. 165 people/km^2) but well below average compared to all other inland wetlands (186 vs. 624 people/km^2); and

(3) for the average built-up area uniquely benefitting from influential green storage upstream per sq. km of wetland, Agusan Marsh WS is consistently below average (1.74 ha/km^2 vs. 2.97 ha/km^2 for RFI inland sites and 5.35 ha/km^2 for all other inland wetlands).

5. Drivers of change and their potential impacts on Agusan Marsh Wildlife Sanctuary

5.1. Current drivers of change and their level of impact

Stakeholders at the RFI workshop[2] identified multiple drivers of change impacting the Agusan Marsh Wildlife Sanctuary. Table 3 highlights these key drivers and their corresponding levels of impact on the wetland site. Agricultural and forestry effluents from logging activities in the Agusan River watershed, a major timber-harvesting landscape in Mindanao, pose a significant threat, having a high impact on the site. These effluents contribute to the degradation of water quality and overall ecosystem health. (Unmanaged) fishing, killing, and harvesting of aquatic resources represent another high-impact activity, threatening the biodiversity within the sanctuary. On the medium impact side, commercial and industrial areas are noted to moderately affect the site. These developments lead to habitat alteration. Housing and settlement within and around the wetland also result in a medium impact, contributing to land use changes and pollution. Transportation infrastructure, such as roads and railroads, as well as utility and service lines, are additional drivers of medium impact, further degrading the habitat and disturbing wildlife. These findings stress the importance of managing both high and medium impact activities to ensure the conservation of the sanctuary's ecological and socio-economic value.

[2] 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 Agusan Marsh Wildlife Sanctuary based on consultations with stakeholders.

Driver of change	Impact
Agricultural and forestry effluents	High
Annual and perennial non-timber crop production	
Desertification	
Drought conditions	
Droughts	
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	
Increased fragmentation within the wetland site	
Industrial, mining and military effluents	
Invasive animal species	
Invasive plant species	
Isolation from other natural habitats	
Logging and timber harvesting	
Loss of cultural links, traditional knowledge and/or management practices	
Loss of keystone species	
Other 'edge effects' that degrade the wetland site values	
Research, education and other work-related activities	
Restoration for conservation	
Commercial and industrial areas	Medium
Dams, hydrological modification and water management/use	
Energy generation, including from hydropower dams, wind farms and solar panels	
Fishing, killing and harvesting of aquatic resources	
Housing and settlement	
Hunting, killing and collecting of terrestrial animals	
Roads and railroads	
Temperature extremes	
Utility and service lines	
Activities of site managers	Low
Air-borne pollutants	
Collecting terrestrial plants or plant products (non-timber)	
Dams within or upstream of the wetland site, which alter the hydrological regime	
Destruction of cultural heritage buildings, gardens, sites, etc.	
Excess energy	
Livestock farming and grazing	
Mining and quarrying	
Natural deterioration of important cultural wetland site values	
Recreational activities and tourism	
Sewage and waste water from wetland site facilities	
Storm and flooding	
Tourism and recreation infrastructure	
Wood pulp and plantations	

5.2. Potential alternative state of Agusan Marsh Wildlife Sanctuary under current drivers of change

Stakeholders at the RFI workshop[3] 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 habitats within this site

[3] 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

(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.

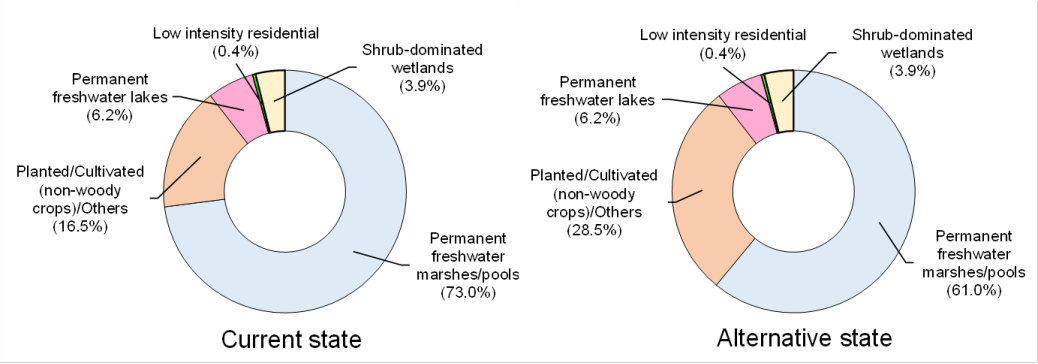

Figure 3 The proportional change in the extent of different habitat types between the current and alternative states of Agusan Marsh Wildlife Sanctuary.

5.3. Expected changes in the ecosystem services of Agusan Marsh Wildlife Sanctuary

Stakeholders at the RFI workshop[4] documented the future trends in the provision of ecosystem services in Agusan Marsh Wildlife Sanctuary, indicating if the ecosystem services provided by this site (to 2035) will increase, decrease, or will remain stable if 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 freshwater provision, remains unchanged in the past but is expected to decrease in the future, while food provision has already seen a decline and is predicted to continue decreasing. Regulating services, including water-flow regulation, flood hazard regulation, and water purification and waste treatment have experienced declines in the past and are projected to further decrease in the future, despite the crucial role they play in benefiting communities at all distances,

In the alternative state, the loss of 12% of freshwater marshes will result in a loss of stored carbon estimated at XXX Mg C.

A loss of 4,909 hectares of permanent freshwater marshes/pools as presented in Table A5, equivalent to 12.0% of the total land use for the site, is expected to result in a significant effective loss of 12.9% or 125 Giga Litres of green storage capacity per km². This reduction, calculated relative to the total green water habitat area, may amount to nearly 24 people and 0.22 hectares of built-up areas losing flood mitigation benefits per km² of wetland.

[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

6. Capacity needs in Agusan Marsh Wildlife Sanctuary

RFI identified the main knowledge and capacity gaps that prevent governments, individuals, groups, organizations, institutions, and societies from sustainably building their ability to comprehend, achieve, and elevate the sustainable conservation and management of wetland resources in a Stakeholder and Capacity Needs Assessment Report. A multi-stakeholder participatory approach was employed, which included a broad-based, semi-structured questionnaire, national stakeholder workshops in four countries (i.e., Bangladesh, Cambodia, the Philippines, and Thailand), and a policy gap analysis spanning from the national level to the site level.

Key findings for the four countries analyzed include: (1) No strong national wetland policies in place to guide funding and staffing, (2) While there are good capacities in wetland policies across the countries, many organizations – especially in unprotected areas – do not have enough resources and capacity, (3) Wetland site managers need more support to improve community livelihoods in a sustainable way, create positive incentives to conserve wetlands, study and monitor wetland health, understand the value of wetland services, and address climate change, natural disasters, and invasive species, and (4) Local communities should be engaged in training and support to take part in wetland conservation and management.

Further site-specific assessment is needed to determine the particular capacity needs of the Agusan Marsh Wildlife Sanctuary stakeholders.

7. Opportunities for RFI interventions

7.1. Recommended Interventions

Studies (e.g. Baclayo et al. 2020; Mora-Garcia et al. 2020), alongside a scoping visit under the RFI project, identified major threats to Agusan Marsh, ranging from unmanaged agricultural activities on the riverbanks, which have increased erosion (Ochavo K. *in litt*. 2024), and limited management of fisheries. Other wider issues include upstream mining and logging activities (major logging in the Caraga region; Agusan del Sur and Surigao del Sur), and invasive species. Proposed interventions to improve the sustainable management of marsh should build upon existing work, including a proposed carbon financing scheme, but need to address, (1) declining fisheries, and (2) limited livelihood opportunities for local people living around, and within the wildlife sanctuary, while immediately curtailing further agricultural encroachment which damages the integrity of the wetlands.

Table 4 Key interventions to improve the management of the Agusan Marsh Wildlife Sanctuary.

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
Component 1. Improvement of sustainable nature-based ecotourism for AMWS					
Strengthen the management of (wetland) nature-based tourism for AMWS	Guiding framework and document to strengthen nature-based tourism in AMWS developed Ecotourism strategy developed and packages developed and tested. Establishment of community funds for tourism operators (to ensure that revenue is re-channeled to communities)	The nature-based tourism plan for the Agusan Marsh landscape developed and rolled-out to key stakeholders, including vulnerable groups (e.g., Manobo community) Number of community funds with tourism operators established.	200,000	1.5 years	Department of Environment and Natural Resources AMWS PAMB DENR PENRO Agusan del Sur Department of Tourism National Commission on Indigenous People People Organisations Concerned provincial and

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
Develop alternative livelihood and income-generating activities for local communities, especially communities near to ecologically sensitive areas.	Ecotourism as a source of local livelihood strengthened, including for the Manobo community.	Number of people benefitting from livelihood activities, with up to 30% beneficiaries from women, youth, elderly, indigenous people, and other vulnerable groups Number of people trained on livelihood activities			municipal government units Conservation organisations (including bird and community-focused NGOs)
Strengthen the capacity of small-scale tourism operators (targeting domestic tourists, agro-tourism and wetland tourism)	Improved capacity of up to five (5) tourism operators to support domestic and international tourists. Training modules and guidance on wetland tourism developed for operators	Number of tourism operators trained Number of capacity-building materials developed and rolled-out to tourism operators	100,000	5 years	Department of Tourism tourism operators People Organisations AMWS PAMB DENR PENRO Agusan del Sur Concerned provincial and municipal government units
Improve infrastructure for tourists	Stronger (and functional) infrastructure to host tourists, including jetties, substations and house boats.	Up to three jetties for tourist boats constructed or repaired. Number of infrastructure established/ improved (i.e., substation for rangers and tourists) constructed	800,000	3 years	

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
Component 2. Wetland restoration and invasive species management					
Restore degraded areas of marshland damaged by agricultural activities and land clearance; rehabilitate cleared areas into natural floodplain marshland and reedbeds	Degraded (or converted) areas restored to natural marshland and water bodies through water management and targeted planting of aquatic species.	Area of natural marshland, including reedbeds restored. Area of artificial pond created for wetland species.	500,000	3-6 years	DENR PENRO Agusan del Sur Research institutions Development Agencies (e.g. GIZ)
Manage invasive species to control areas encroached by water hyacinth and Giant Mimosa *Mimosa pigra*	Guiding framework and document for improved management of invasive species in AMWS. Wetland under sustainable management scaled up; invasive species under regular management, with trials applied in years 1 and 2.	An invasive species management plan for AMWS developed and rolled out to key stakeholders, including vulnerable groups (i.e., Manobo community) Area of marshland (across five highly infested areas), managed yearly, alongside regular monitoring.	500,000	5 years	DENR PENRO Agusan del Sur Development Agencies (e.g. GIZ)
Component 3. Improve of watershed management for the Agusan Marsh and Agusan River Basin					
Improve watershed protection of the Agusan River basin	Watershed management plan adapted with current environmental	A watershed management plan for the Agusan River Basin updated and	500,000	2 years	DENR AMWS PAMB

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
and watershed	issues and updated for the Agusan Marsh Capacities strengthened for selected LGUs across selected municipalities on watershed management, with a focus on addressing water pollution, solid waste pollution, and agricultural activities (e.g. illegal clearance). Illegal agricultural activities along river systems curtailed and managed (no net increase)	rolled out to key stakeholders, including vulnerable groups (i.e., Manobo community) Number of LGU staff trained Number of capacity-building materials on watershed management developed and rolled-out to concerned LGUs. Number of documented and reported to key authorities. Number of implemented patrolling activities to curtail illegal agricultural activities.			PENRO Agusan del Sur Peoples Organisations (PO) LGUs Conservation organisations (including bird and community-focused NGOs) Development Agencies (e.g. GIZ)

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
Establish a biodiversity and wetland monitoring scheme focusing on fish and birds (both terrestrial and waterbirds)	Better monitoring of biodiversity and wetland ecosystems in AMWS performed through a multi-stakeholder conservation monitoring group guided by a collaborative workplan and includes vulnerable groups (i.e., Manobo community)	Monitoring framework and mechanism for the site established. Number of monitoring activities conducted using the established biodiversity and wetland monitoring scheme. A locally led conservation group organized, with representations from vulnerable groups (i.e., Manobo community)	500,000	3 years	PENRO Agusan del Sur AMWS PAMB LGUs Research Institutions (Agusan State University)
Component 4. Establishment of a payment for ecosystem services (PES) scheme for the Agusan River Basin					
Assess the feasibility of payments for ecosystem services.	Feasibility studies conducted to assess payment for ecosystem services with key (downstream) cities, e.g. Butuan	PES applicability to the Agusan River Basin assessed and consulted with key stakeholders.	100,000	1 year	AMWS PAMB Research institutions Conservation organisations LGUs
Depending on the results of the feasibility assessment, establish a PES scheme for the Agusan floodplain,	PES mechanism established for the Agusan River basin. Governance structures involving relevant LGUs set up	PES mechanism and framework established, with (1,000,000 per annum) revenue generated for rice farmers and landowners in the	500,000	8 years	Pampanga PENRO Department of Environment Research Institutions

Intervention	Outcome	Indicators	Cost (USD)	Timeframe	Potential Stakeholders
with major downstream cites (Las Nieves, Esperanza, Magallanes, Butuan City, and Bayugan City)		Pampanga River Basin.			Conservation organisations
Component 5. Sustainable fisheries for the Agusan River Basin					
Promote sustainable fisheries practices for small-scale fishers in at least two municipalities with major fishery activity (e.g. Talacogon, Lapaz) Improve fisheries management for the Agusan Marsh, with guidance on fishing take quota over the flood season.	More sustainable fishing practices adopted by small-scale fishers, especially for declining fish species. Sustainable fisheries management plan developed to support selected LGUs to increase the capacity of small-scale fishers to undertake sustainable fishing practices	Small-scale fisheries management plan updated or developed for Agusan Marsh and rolled out to fisherfolk and other relevant stakeholders Number of fish monitoring surveys carried out at selected priority fishing areas to determine recovery of selected declining fish species.	500,000	5 years	Bureau of Fisheries and Aquatic Resources (BFAR) PFO Agusan del Sur MAO Agusan del Sur MDA LGUs Conservation NGOs
Total investment for over 8 years			17,800,000		

7.2. Potential Financing

The estimated project cost is USD 17,800,000 over an 8-year period. This project budget supports the strengthening of local nature-based tourism, the restoration of degraded areas, the updating of management plans to address degrading wetland areas, invasive species, and unsustainable fishing practices, the assessment and piloting of payment for ecosystem services, and the institutionalization of a biodiversity monitoring system.

A carbon financing scheme involving AMWS and other wetland sites in the Philippines is being developed by Lestari Capital and other investors, and if successful, can generate credits that will benefit indigenous communities. There are good opportunities to involve the private sector to provide co-financing. Off takers in the private sector need to agree on price, while ADB can underwrite the scheme.

Agusan Marsh Wildlife Sanctuary is also a part of the ASEAN Heritage Parks (AHP) network and ongoing socio-cultural mapping would provide useful output for this proposed project.

Other relevant initiatives operating in AMWS include the PLDT-Smart peatland conservation, and investment into carbon credits by the airline company, Cebu-Pacific.

7.3. Proposed Institutional Arrangements

The proposed project is expected to be multi-phased over a period of 5-8 years. The development of a PES involving downstream cities such as Butuan is expected to take 3-5 years to set up.

7.4. Project Beneficiaries

There are significant Manobo communities that live around and within AMWS. Existing and past projects on fisheries, wetland restoration, and rural development have engaged the Manobo people and should be expected to do so under any new projects developed for the landscape.

7.5. Anticipated Implementation Risks

Social Safeguards: Increased enforcement of encroachment activities within AMWS, especially against illegal agriculture may result in conflicts with some local communities. Interventions led by PAMB and other government agencies should expect to have the support of people organisations within and around the wetland. Introduction of fishery guidelines may have short term impact on the incomes of small-scale fishers. Scoping studies will be needed to assess the impact of these regulations on domestic incomes and the challenges of implementing these restrictions in a complex environment.

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 tourism experience in the AMWS. Building these infrastructures, however, would induce noise that may disturb the wildlife in the area. Moreover, construction of tourism facilities such as jetties and substations may result in localised soil erosion and damaged to the wetlands. Planning with the stakeholders is critical before any infrastructure development.

References

ASEAN Centre for Biodiversity: Agusan Marsh Wildlife Sanctuary. Available at: https://asean.chm-cbd.net/agusan-marsh-wildlife-sanctuary

Asian Waterbird Census (AWC): Philippines data for 2019-2021. See https://eaaflyway.net/asian-waterbird-census

Baclayo, J. M., Alcantara, M. T., Holoyohoy, L. M., & Alaba, L. A. (2020). Status of Fisheries in Agusan Marsh: Lapaz and Talacogon, Agusan del Sur, Mindanao. *The Philippine Journal of Fisheries*, 27(1): 54-82.

BirdLife International Important Bird Area factsheet: Agusan marsh (Philippines). Available at: https://datazone.birdlife.org/site/factsheet/agusan-marsh-iba-philippines

DENR (Department of Environment and Natural Resources) PENRO Agusan del Sur: Agusan Marsh Wildlife Sanctuary. Available at: https://denrpenroads.com/index.php/priority-programs/national-greening-program/protected-area-biodiversity-and-ecotourism

Hubilla, M., Kis, F., & Primavera, J. (2008). Janitor fish *Pterygoplichthys disjunctivus* in the Agusan Marsh: a threat to freshwater biodiversity. *Journal of Environmental Science and Management*, 10(1).

IUCN Red List of Threatened Species. Available at: www.iucnredlist.org

Mallari, N. A. D., Tabaranza, B. R. Jnr and Crosby, M. J. (2001) Key conservation sites in the Philippines: A Haribon Foundations and BirdLife International directory of Important Bird Areas. Makati City, Philippines: Bookmark.

Mongabay (July 2023): Philippines' largest freshwater wetland and Indigenous livelihoods face multiple threats. Available at: https://news.mongabay.com/2023/07/philippines-freshwater-wetlands-and-indigenous-livelihoods-face-multiple-threats/

Mora-Garcia, C., Campos Jr, R. G., & Seronay, R. A. (2020). Perceived ecosystem services towards the conservation of Agusan marsh wildlife sanctuary in Mindanao, Philippines. *International Journal of Conservation Science*, 11(1): 199-208.

Mundkur, T. & Langendoen, T. (2022) *Report on the Conservation Status of Migratory Waterbirds of the East Asian – Australasian Flyway Partnership. First Edition. Draft Report to the East Asian – Australasian Flyway Partnership.* Wetlands International, Ede, The Netherlands. Available at: https://www.wetlands.org/publication/eaaf-conservation-status-review1/

Orella, J., Africa, D. R., Bustillo, C. H., Pascua, N., Marquez, C., Adornado, H., & Aguilos, M. (2022). Above-and-belowground carbon stocks in two contrasting peatlands in the Philippines. *Forests* 13(2): 303.

Paz, S.L. & Gonzalez, J.C.T. (2021) Understanding human-flying fox interactions in the Agusan Marsh Wildlife Sanctuary as basis for conservation policy interventions. *Journal of Threatened Taxa* 13(11): 19431-19447. https://doi.org/10.11609/jott.7466.13.11.19431-19447

Ramsar Site Information Sheet: Agusan Marsh Wildlife Sanctuary. Available at: https://rsis.ramsar.org/ris/1009

Scott, D.A. (1989) *A Directory of Asian Wetlands.* IUCN: Gland, Switzerland & Cambridge, U.K. Available at: https://portals.iucn.org/library/node/5933

Sumilhig, H. J., Talitod, A. M., Yurong, C. Y., Tumarao, M., Vasquez, S., & Ibonia, E. (2024). Species Richness of Avifauna in the Agusan Marsh Wildlife Sanctuary, Northeastern Mindanao, Philippines. *Journal of Ecosystem Science and Eco-Governance*, 6(2): 47-70.

UNESCO World Heritage Convention: Agusan Marsh Wildlife Sanctuary. Available at: https://whc.unesco.org/en/tentativelists/6716/

Wetlands International Philippines: Agusan Marsh. Available at: https://www.linkedin.com/posts/wetlands-international-philippines_philippines-largest-freshwater-wetland-and-activity-7094561925916684288-8G-k/

Wetland Link International: Agusan Marsh Wildlife Sanctuary. Available at: https://wli.wwt.org.uk/?member=agusan-marsh-sanctuary

Annex 1. Supplementary information on flood mitigation 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 flood mitigation were spatially inferred in QGIS from a selection of metrics expressing different biophysical values modelled online by the Water World component of this tool. Equivalent data to assess monetary values similarly to coastal protection were not available for the RFI region.

The key metrics selected for biophysical values (Table A1) were the average green storage capacity, which is the volume of water stored by each square kilometre of wetland itself as well as its soil and vegetation, and the direct influence of this storage capacity on beneficiaries found downstream of the wetland, both as the average number of people and the average built-up area that are uniquely benefitting from the resulting flood mitigation (and not from other green storage found upstream).

Table A1. Contribution of the wetland habitats to flood mitigation in Agusan Marsh WS based on site-level (biophysical) values inferred from Mulligan (2022) and expressed as ranges to represent the resulting uncertainty.

Influence of the wetland on flood mitigation (metrics)	**Benefit/Beneficiaries**
Average green storage capacity per sq. km of wetland in million cubic metres (GigaLitres/km2)	936 – 997
Average population uniquely benefitting from influential green storage upstream per sq. km of wetland (n/km2)	180 – 192
Average built-up area uniquely benefitting from influential green storage upstream per sq. km of wetland (ha/km2)	1.68 – 1.80

Table A2. Biophysical benefits from and beneficiaries of RFI inland wetland sites (expressed as ranges to represent the resulting uncertainty) and at the national level.

Site name	**Green storage capacity (GigaLitres/km^2)**	**Downstream population (n /km^2)**	**Downstream built-up area (ha /km^2)**
Agusan Marsh Wildlife Sanctuary	967 (±30)	186 (±6)	1.74 (±0.06)
Candaba Wetlands	309 (±33)	129 (±13)	6.35 (±0.64)
Lake Mainit	412 (±49)	181 (±18)	0.83 (±0.08)
Philippines RFI average	562	165	2.97
Philippines national average	448	624	5.35

Table A5. Key habitat types in Agusan Marsh 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 (%)
Permanent freshwater marshes/pools	29824.3	73.0	24915.0	61.0
Planted/Cultivated (non-woody crops)/Others	6750.4	16.5	11659.7	28.5
Permanent freshwater lakes	2536.5	6.2	2536.5	6.2
Low intensity residential	163.6	0.4	163.6	0.4
Shrub-dominated wetlands	1595.5	3.9	1595.5	3.9
Total area	40870.4	100.0	40870.4	100.0