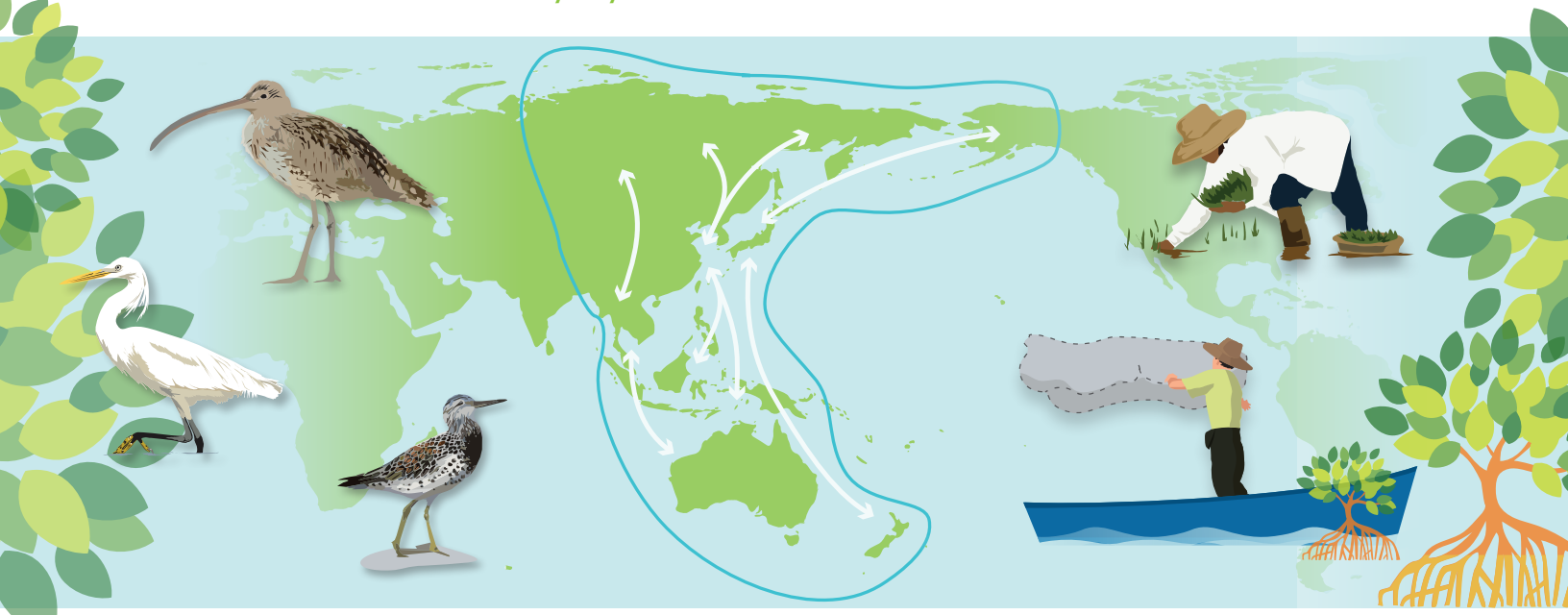
REGIONAL FLYWAY INITIATIVE

Investing in Sustainable Wetlands Management in the East Asian–Australasian Flyway



Nature-Based Solutions that Deliver for People, Nature, and the Climate

The Regional Flyway Initiative (RFI) seeks to mobilize $3 billion in investments to protect, restore, and sustainably manage a vast regional network of natural wetlands along the East Asian-Australasian Flyway. The large-scale regional program aims to preserve their globally significant biodiversity values and the ecosystem services and benefits they provide to hundreds of millions of people over the long-term.

The East Asian-Australasian Flyway

The East Asian–Australasian Flyway extends across 22 countries from Alaska and the far east of the Russsian Federation, southwards through East Asia and Southeast Asia, to Australia and New Zealand. Wetlands along the Flyway directly provide critical ecosystem services to nearly 200 million people in Asia and the Pacific—from food and water to building materials, medicines, recreation, water purification, and many other benefits—while regulating flood waters and sequestering carbon. They host remarkable biodiversity and are sources of significant income—driving and supporting agriculture, fisheries, tourism, and other industries. More than 50 million migratory waterbirds, along with a diverse range of other animal and plant species, depend on these wetlands for food, shelter, and other essential needs.

Healthy Wetlands Increase Resilience

The massive benefits these wetlands provide to local communities often extend to regional and global scales. Wetlands occupy only 5% to 8% of the earth's total land surface but hold more than 35% of the estimated 1,500 gigatons of organic carbon stored in soils.[1] They lessen the impacts of storm surges, flood waters, and droughts and have become even more important as sea levels rise and climate impacts increase. During periods of social and economic stress, communities rely on wetlands for food, water, and basic services.

Threatened and Most Vulnerable

Despite all the ecosystem services and co-benefits provided, the East Asian-Australasian Flyway is the most threatened of the world's eight major bird migratory flyways due to the large-scale loss and degradation of its coastal, intertidal wetland habitats.

Along the Flyway's path, wetland areas have decreased by about 50% in the People's Republic of China, 40% in Japan, 60% in the Republic of Korea and 70% in Singapore,[2] while, up to 45% of inter-tidal wetlands in Southeast Asia are gone and about 80% of its remaining wetlands are threatened.[3]

Rapid urbanization, intensive agriculture and aquaculture, and intertidal reclamation to meet increasing demand for land, food, and water, along with climate change, have driven the loss of wetlands.[4]

The health of remaining wetlands along the Flyway are deeply threatened by habitat fragmentation, water drainage, disrupted flows, sediment dumping, invasive species and polluted runoff especially in rapidly urbanizing areas.

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1 W.J. Mitsch and J.G. Gosselink. 2015. *Wetlands (5th ed.)*. New Jersey, US: John Wiley & Sons, Inc.

2 M.J. Hilton and S.S. Manning. 1995. Conversion of coastal habitats in Singapore: Indications of unsustainable development. *Environmental Conservation*. 22. pp. 307–322; A.T.K. Yee et al. 2010. The present extent of mangrove forests in Singapore. *Nature in Singapore*. 3. pp. 139–145. Quoted in J. MacKinnon, Y. Verkuil, and N. Murray. 2012. IUCN situation analysis on East and Southeast Asian intertidal habitats, with particular reference to the Yellow Sea (including the Bohai Sea). *Occasional Paper of the IUCN Species Survival Commission No. 47*.

3 A.C. Hughes. 2017. Understanding the drivers of Southeast Asian biodiversity loss. *Ecosphere*. 8 (1). p 13.

4 MacKinnon et al., IUCN situation analysis, pp. 21–23.

ECOSYSTEM SERVICES AND CO-BENEFITS IN WETLANDS

Socio-economic development

- Food security
- Raw materials
- Medicinal security
- Water security
- Livelihoods

Personal and cultural values

- Cultural and spiritual connection
- Recreation
- Community building
- Aesthetic values
- Health and wellness

Climate adaptation and resilience

- Air quality regulation
- Climate regulation
- Water regulation
- Erosion regulation
- Water purification
- Moderation of extreme events

Ecosystem resilience

- Species habitat
- Nutrient cycling
- Photosynthesis
- Soil formation/Soil integrity
- Disease and pest regulation
- Pollination

Source: ADB Regional Flyway Initiative (adapted from TEEB Europe).

"The pressure on wetlands is likely to intensify in the coming decades due to increasing demand for land and water and challenges caused by a changing climate."

Pollution from industrial and domestic sources quickly and often, irrevocably degrades wetlands and their ability to function and provide key ecosystem services.[5] A focus on short-term results at the expense of long-term interests, market forces, and poverty also lead to overexploitation of wetland species and lead to the introduction of invasive species. Regulatory weakness and poor environmental governance aggravate these complex challenges. Climate change impacts such as sea level rise, floods, drought, and increasing intensity of extreme weather events adversely affect wetlands and wetland species. Conversely, loss and degradation of these natural carbon sinks further contributes to global warming.

Regional Flyway Initiative: Nature-based solutions in wetlands provide efficient, inclusive, and proven interventions—ensuring protection of habitats and species while supporting communities and delivering climate co-benefits.

To address the threats that continue to impact the East Asian-Australasian Flyway, the RFI plans to develop a long-term program comprising:

A development phase that will:

- identify knowledge and capacity gaps and help address them;
- identify priority sites and develop investment concepts for the Asian Development Bank (ADB) developing member countries (DMCs) ; and

An implementation phase that will then deliver:

- project investments over a 10-year period; and
- a sustainable financing mechanism and granting resource to support Flyway-focused activities in ADB DMCs.

The RFI focuses on wetlands in East and Southeast Asia which support a quarter of all the world's migratory waterbird species and the majority of the migratory bird species that use the Flyway.

Through the protection, restoration, and sustainable management of wetlands, the RFI aims to demonstrate the fundamental role of nature-based solutions in a green, inclusive, and resilient future for the region.

The RFI works with DMCs to identify and support the development of investment-ready projects and necessary funding mechanisms. This approach will facilitate the development of the long-term investment program needed to deliver the ambition of the RFI for regional scale impacts.

[5] R.S. Shomura and H.O. Yoshida, eds. 1985. *Proceedings of the Workshop on the Fate and Impact of Marine Debris, 26-29 November 1984, Honolulu, Hawaii, NOAA Technical Memorandum NMFSSWFC-54, 580*. Washington, DC, US: Department of Commerce.

MIGRATORY WATERBIRDS OF THE EAST ASIAN-AUSTRALASIAN FLYWAY

The huge loss of wetlands along the Flyway in East and Southeast Asia has placed hundreds of bird species under threat. Twenty percent of the Flyway's waterbird species—including the Black-faced Spoonbill, Saunder's Gull, Chinese Egret and Spoon-billed Sandpiper—are globally threatened.

BIRDS (globally threatened, dependent on coastal wetlands in East and Southeast Asia)

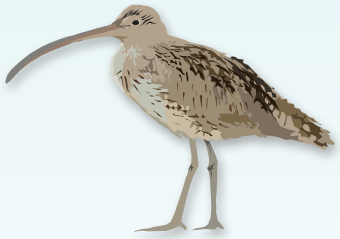
CR Critically Endangered EN Endangered VU Vulnerable

CR Spoon-billed Sandpiper
(Calidris pygmaea)

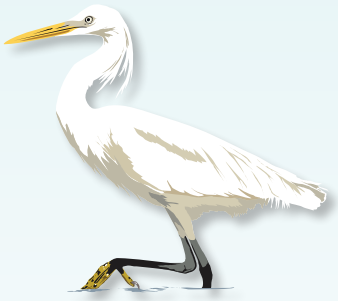
EN Great Knot
(Calidris tenuirostris)

EN Spotted Greenshank
(Tringa guttifer)

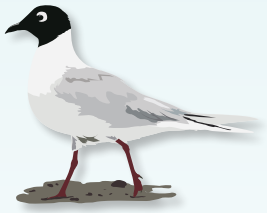
EN Black-faced Spoonbill
(Platalea minor)



EN Far Eastern Curlew
(Numenius madagascariensis)



VU Chinese Egret
(Egretta eulophotes)



VU Saunders's Gull
(Saundersilarus saundersi)

Waterbirds and their unique role

Waterbirds play key functional roles in aquatic and terrestrial ecosystems, including as predators, herbivores and vectors of seeds, invertebrates and nutrients. Essential to aquatic and marine food chains, waterbirds help control pests, are effective bioindicators of ecological conditions, and act as sentinels of potential disease outbreaks and climate change.[6] They also provide spiritual and cultural services to communities.

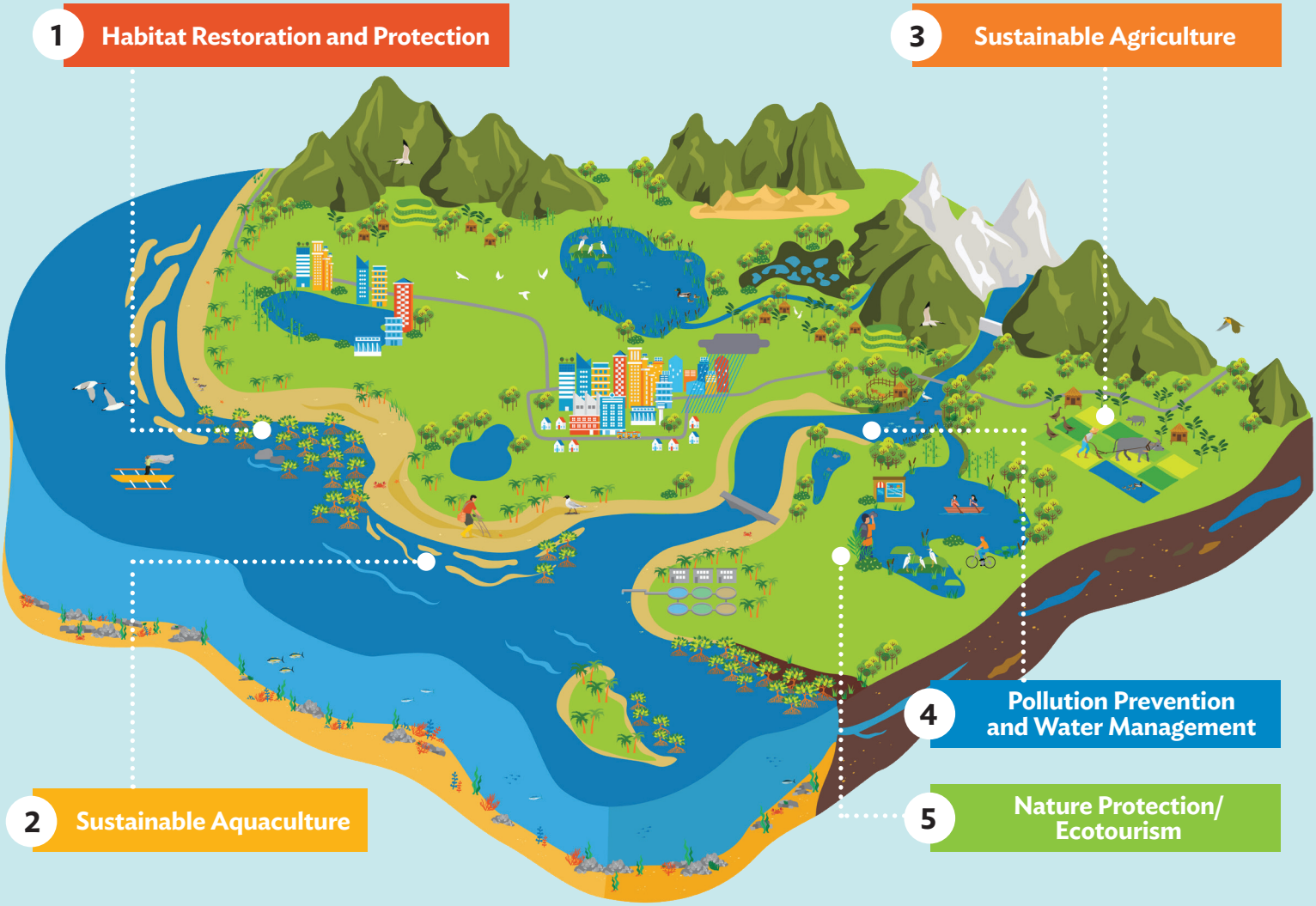
Moreover, they facilitate the colonization of new or restored wetlands by plants and invertebrates, promote decomposition of waste rice straw, reduce the incidence of fish die-offs, and provide an inexpensive and practical means of monitoring the conservation status and health of different wetland sites.[7]

Only through nature-based regional initiatives, like the RFI, can migratory waterbirds be protected at the continental scale, and the nature and climate crises be addressed.

[6] A.J. Green and J. Elmberg. 2013. Ecosystem services provide by waterbirds. *Biological Reviews.* 89 (1). p. 2.
[7] Ibid., page 12.

Regional Flyway Initiative Projects: Investment Concepts

As an initial guide, ADB presents five broad conceptual investment models for wetland sites:



Drawn from project experiences on-the-ground, these model investment concepts incorporate lessons learned and real-world benefits achieved.

When properly planned, implemented, and sustainably managed, RFI projects following any of these concepts can deliver significant benefits for people and nature and deliver huge cross-cutting benefits for climate adaptation, mitigation and resilience—potentially contributing to Nationally Determined Contributions, National Adaptation Plans, and National Biodiversity Strategies and Action Plans, as well as food security in some cases.

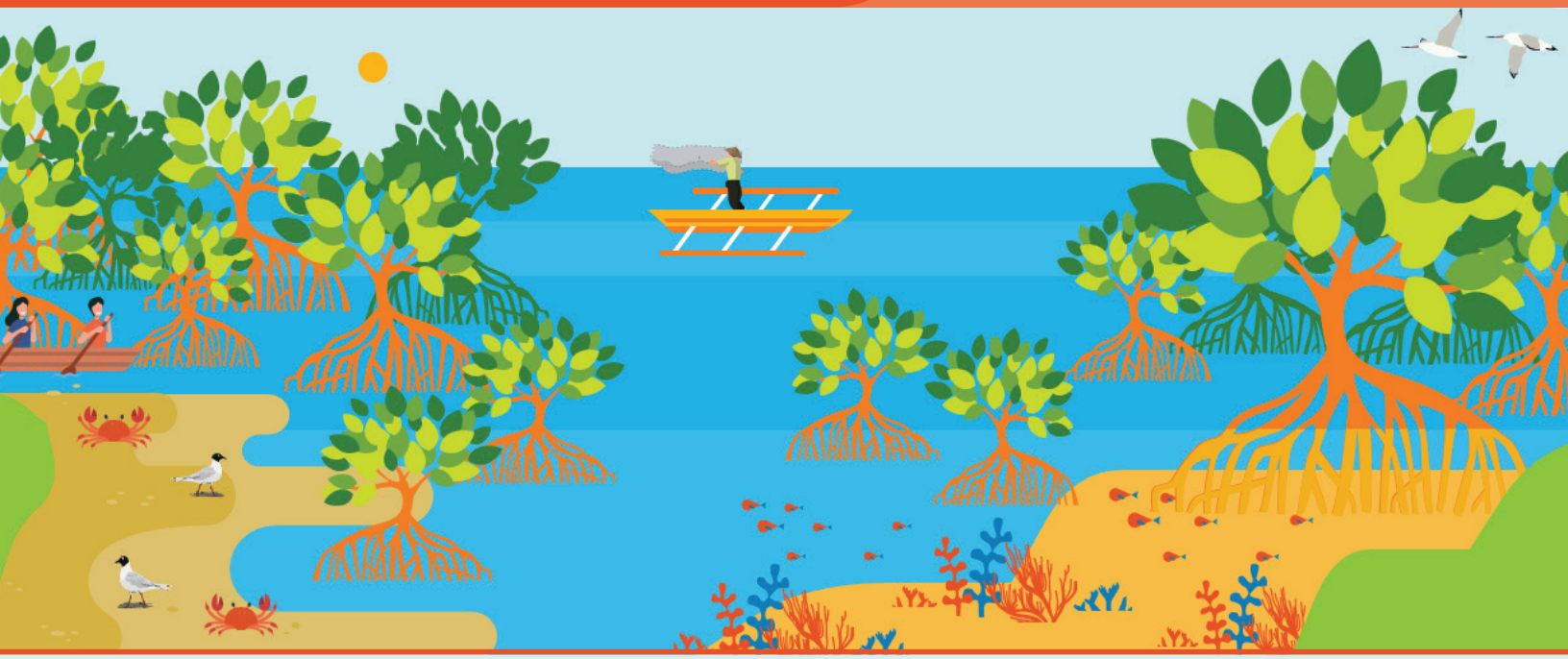
Note that every project investment is unique and will be tailored to local needs, conditions, and management priorities at each wetland site, and may contain different elements from the outlined models.

The RFI team of ADB, Birdlife International, and the East Asian–Australasian Flyway Partnership stand ready to support DMC borrowers and clients with further analytical data where available and to help build the business case for any RFI investment.

REGIONAL FLYWAY INITIATIVE INVESTMENT CONCEPT 1

HABITAT RESTORATION AND PROTECTION

Restoring and protecting mangroves and other wetland habitats has clear economic and ecological benefits.



RFI investments in restoring and protecting habitats (such as mangroves and mudflats) can lead to compounding co-benefits for local communities, nature, and climate along the East Asia–Australasian Flyway.

Interventions include habitat restoration, rehabilitation, disaster risk reduction, reforestation, regeneration and plantation. Mangrove restoration based on best practices can help ensure food security, ecotourism and other income generating opportunities. As a cost-effective intervention on ecosystems management for climate adaptation and mitigation, it can deliver nature-based coastal protection.

WHY MANGROVE RESTORATION MATTERS

$100,000/year
estimated economic loss to fisheries due to removal of 1,200 hectares of mangroves (Thailand)

$60.3 million to $91.6 million
value of global climate regulation from carbon storage in wetlands (Myanmar and Viet Nam)

2.4 to 8.4 years
time to recover costs of restoring fisheries through mangrove restoration; after which benefits are generated in perpetuity without additional costs (discount rate not factored in; Thailand)

BENEFITS OF MANGROVE AND OTHER WETLAND HABITATS

$1 billion/year
of averted property damage through floodwater protection (Philippines)

$484-$595 per hectare
of products provided to communities (Thailand)*

$53 million/year
diverse value of the Sundarban mangroves and value of tourism and cultural services (Bangladesh)

*Barbier (2007), Net present value

CASE EXAMPLE

DA LOC, VIET NAM

Community-based Mangrove Reforestation and Management

Study area: 200 hectares (2007-2009)

70%–90% survival rate
of planted mangroves

1,000 households
now able to collect fish, crabs and mollusks in the new mangrove areas

7 to 10 days/month
when poor people, mainly women, are able to collect mollusks and fish at low tide

up to 400% increase in rice yields
biannual rice crop yields increased between 50 kilograms and 200–300 kilograms (per 500 square meters) with improved canals

References: Barbier (2007) as cited in Holl (2020); Barbier (2000) as cited in Lewis (2001); Barbier, (2011); Buffle et al. (2009); Camacho et al. (2020); Menéndez et al. (2018); Winrock (2014) as quoted in Jhaveri (2018).

REGIONAL FLYWAY INITIATIVE INVESTMENT CONCEPT 2

SUSTAINABLE AQUACULTURE

Sustainable aquaculture and fisheries support food, nutrition, and water security for wetland communities.

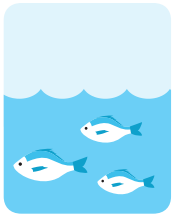
Intensive aquaculture is a key driver of wetland loss, resulting in habitat degradation, species loss, the spread of invasive species, pollution, and increases to nutrients and chemical loads.

RFI investments in aquaculture can drive communities to more sustainable aquaculture and fisheries practices, delivering long-term sustainable food security and improving nutrition. They could also restore natural waterways and ecosystems and create economic opportunities through the development of sustainable premium products.

WHY SUSTAINABLE AQUACULTURE AND FISHERIES MATTER

43% and 50%
increase in survival rate for tiger shrimp and milkfish due to aquaculture practices (Indonesia)

80% of protein intake in the Lower Mekong region
is derived from the world's most productive inland fisheries supported by Lower Mekong Delta wetlands



BENEFITS OF WETLAND FISHERIES

$708–$987/hectare
net present value of mangroves as breeding habitat which supports off-shore artisanal fisheries (Thailand)

$1,000–$2,750 per hectare/year
economic value of clam harvesting (Viet Nam)

12.4%
wetland-lake resources contribution to household income (Nepal)

2x increase income
for local shrimp farmers after shifting to more sustainable practices (Indonesia)

CASE EXAMPLE

WEST BENGAL, INDIA

Sustainable Livelihood from Aquaculture Technologies

Study area: 5.85 hectares (2014)

51 families
benefited from sustainable aquaculture in small area

4.3 tons/hectare–4.9 tons/hectare per year
in fish production, from a low of 1 ton/hectare per year. (before the intervention)
Fish is the main source of protein.

50% increase in profit
profit from fish pond and duck-raising (from zero before the intervention)

References: Moran & Vu (2012); Barbier (2009); Hakim (2016); ICAR-CIFA (2016); Thomas et al. (2017).

REGIONAL FLYWAY INITIATIVE INVESTMENT CONCEPT 3

SUSTAINABLE AGRICULTURE

Sustainable agriculture can strengthen long-term food and livelihood security while delivering net gains for biodiversity.

Agriculture is one of the greatest threats to wetlands along the Flyway, causing direct loss and/or habitat degradation. Wetlands lose their ability to support food security and agriculture when used or managed unsustainably.

RFI investments in sustainable, climate-smart agriculture can be multifaceted, comprising reduction or elimination of chemical fertilizers and pesticides, integrated crop-livestock systems and introduction of diverse crop rotation, as well as integrated water and waste management. Sustainable agriculture can strengthen long-term food and livelihood security for communities while delivering gains for biodiversity.

WHY SUSTAINABLE AGRICULTURE MATTERS

4000% increase in farmers' earnings
after restoring wetlands and introducing sustainable agriculture practices

Data based on People's Republic of China (2011)

80% of households report benefits
from wetland products and services to their food security

Data based on Uganda (2013)

52 million hectares
of arable land will be added to the 1,534 million hectares already being exploited for agriculture (global data)

BENEFITS OF WETLANDS TO AGRICULTURE

$5.86 billion/year
of marketed products or commodities from agriculture in wetlands

$6.32 million/ hectare per year
economic losses if paddy fields are converted to non-agricultural use

$30.73 billion/year
contribution of environmental services to total economic value of a wetland site

Data based on West Java, Indonesia (2021)

CASE EXAMPLE

TOYOOKA CITY, JAPAN

Sustainable Agriculture and the Return of the Oriental White Storks

Area: 1,355 hectares (100% organic) and 272 hectares (partly organic)

75% to 100%
reduction of pesticide and fertilizer use

204
number of storks flying in Japan (and under captive breeding) in 2017 from local extinction in 1971

70% to 200%
increase in rice price due to shift to organic farming

Significant biodiversity value
Stork-friendly farming methods prevent bio-accumulation of chemicals which could deplete natural prey and hinder stork reproduction

References: ADB (2015); Saputra and Setiyanto (2021); N. Turyahabwe (2013); Madre and Devuyst (2015); Ohsako (2011); Ministry of the Environment Japan (2010).

REGIONAL FLYWAY INITIATIVE INVESTMENT CONCEPT 4

POLLUTION PREVENTION AND WATER MANAGEMENT

Preventing pollution and sound water governance offers massive benefits.

Properly managed wetlands can intercept runoff and transform and store pollutants like sediment, nutrients, coliform and certain heavy metals without being degraded.

RFI investments will aim to realize the full potential of wetlands—particularly in urban environments—for delivering effective pollution and water management using nature-based solutions. This will ensure local wetland communities are less susceptible to flooding and pollution events. RFI investments will provide financing schemes to ensure wetlands are managed sustainably, over the long-term.

WHY POLLUTION PREVENTION AND WATER MANAGEMENT MATTERS

$1.4 million/year saved

by 220 people using constucted wetlands for wastewater treatment (Albania)

48% reduction

of biological oxygen demand in wastewater treated in constructed wetlands (Australia)

85%-90% organic pollutants reduced

in wastewater treatment in constructed wetlands (Dominican Republic)

BENEFITS OF WETLANDS TO POLLUTION PREVENTION

$2.9 billion/year

avoided cost of constructing artificial wetlands to replace natural wetlands' existing phosphorus filtration

$4.2 billion

avoided costs of sediment filtration and phosphorus removal services

$13 billion

cost of implementing agricultural best management practices to remove an equivalent phosphorus load annually

Data based on Canada (2021)

CASE EXAMPLE

ATHURA DISTRICT, UTTAR PRADESH STATE, INDIA

Constructed Wetlands and Natural Treatment of Wastewater

Area: **1.2 hectares**

90% to 95%

rate of removal of fecal coliform in waste water through a constructed wetland

35 square meters

area required to treat a wastewater load of about 20 cubic meters a day

Significant biodiversity value

Significant reduction of contaminants entering big bodies of water, 100% of water recycled, minimal electricity use

References: University of Waterloo (2022); GIZ Albania (2021); Greenway & Simpson (1996) as cited in Almuktar et al. (2018); The Nature Conservancy (2021); Thamke (2021).

REGIONAL FLYWAY INITIATIVE INVESTMENT CONCEPT 5

NATURE PROTECTION AND ECOTOURISM

Protecting natural wetlands creates massive ecotourism benefits and opportunities.

Wetlands along the Flyway possess high untapped ecotourism potential with their biodiversity, spiritual, cultural and recreational values.

RFI investments aim to protect nature in wetlands and enhance ecotourism for birdwatching and other activities. These interventions can drive sustainable development and be strong tools of sustainable development. They can combine conservation, tourism, and education functions, delivering direct jobs, economic opportunities, and long-term livelihood benefits.

WHY NATURE PROTECTION AND ECOTOURISM MATTERS

60% per year
potential increase in annual net revenues from reef and mangrove fisheries and tourism expenditures if reef quality and wetland stewardship is improved (Philippines)

10% to 12% growth/year
in ecotourism globally, signaling the need for more sustainable practices

Over €5 billion
cost of indirect damage to fishers, tourism industry, local people's livelihoods, and lost natural values due to an oil spill (France and Spain)

20% of all birds from an estimated 9,000 species depend on wetlands (global data)

BENEFITS OF WETLANDS TO ECOTOURISM

60.1%
of wetland ecosystem services support ecotourism, 28.4% support flood regulation, and 6.7% local biodiversity (Colombia)

$95,333
recreational benefits enjoyed by visitors in a wetland ecotourism site (India)*
*Venkatachalam & Zareena Begam (2016), value for 2015 only

$1.35 billion/year
contribution of reef-based ecotourism to the national economy (Philippines)

$55/visitor
willingness to pay to enjoy a tidal ecotourism wetlands site, Anmyeondo Island (Republic of Korea)

CASE STUDY
INDONESIA
Best Practices on How Conservation Drives Tourism and Economic Growth

40,000 people in 135 villages
beneficiaries of the marine and wetland ecosystem

15,701 tourists
generated $1 million in revenues

14x growth
in resort occupancy (75x for homestay)

160
local staff employed with total annual income of $10,865 a year

References: Sierra et al. (2021); White et al. (2000); Hee Dong Pyo (2001); Garcia (2003) as cited in De Groot et al. (2006); BIMP-EAGA (2017); Venkatachalam & Zareena Begam (2016); Nuckel (2019).

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Regional Flyway Initiative

Investing in Sustainable Wetlands Management in the East Asian–Australasian Flyway

The Regional Flyway Initiative (RFI) encourages investment in wetland restoration and sustainable management along the East Asian-Australasian Flyway. The RFI seeks to develop a list of priority wetlands and mobilize $3 billion in investments to protect, restore, and sustainably manage them. Future projects will help developing member countries of the Asian Development Bank to preserve and protect significant biodiversity values and ecosystem services while supporting the livelihoods and food security of local communities. This publication shares five conceptual investment models for wetland sites. The concepts focus on habitat restoration and protection, sustainable agriculture and aquaculture, pollution prevention and water management, and nature protection and ecotourism.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

About BirdLife International

BirdLife International is a global partnership of conservation organizations (NGOs) that strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources. Together there are over 100 BirdLife Partners worldwide – one per country or territory – and growing.

About the East Asian–Australasian Flyway Partnership

The East Asian–Australasian Flyway Partnership aims to protect migratory waterbirds, their habitat and the livelihoods of people dependent upon them. There are currently 39 Partners including 18 countries, 6 intergovernmental agencies, 13 international non-governmental organisations (NGOs), international organization and 1 international private enterprise.

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