

Policy pointers

Policymakers working on water and biodiversity must develop policies and strategies that support the sustainable management of aquatic ecosystems and fish biodiversity, and which respond to climate change. Specific policies are needed to address climate change impacts in the fisheries sector.

Decision makers need research data on how climate change will affect freshwater habitats, fish biodiversity and the people dependent on them. Further research can also help identify the most successful adaptation strategies for this context.

Policymakers should consult fishers and replace public waterbody leasing policies with ecosystem- and community-based fisheries management systems that better support adaptation.

Managers and policymakers must ensure that related sectors, such as water management, do not harm aquatic ecosystems and biodiversity. And sectors affecting sustainable fisheries management and adaptation planning should be better coordinated. Government stakeholders need programmes to increase their awareness of ecosystem-based adaptation.

Mainstreaming adaptation benefits for Bangladesh's freshwater ecosystems

The unplanned climate change adaptation benefits of a programme focused on Bangladesh's freshwater ecosystems is making a case for this kind of initiative to be formally included in the country's ecosystem-based adaptation (EbA) and climate change responses. The 'incentive-based hilsa conservation programme' was not designed with adaptation in mind but has nonetheless shown that, in the context of climate change, EbA is a useful tool for managing freshwater ecosystems and biodiversity for livelihoods. The programme could be improved by increasing participation and ensuring its design does not disadvantage vulnerable people. We use this example to look at some challenges to, and opportunities for, implementing EbA in Bangladesh; we suggest next steps for establishing this approach as a powerful response to the linked issues of climate change and poverty.

Ecosystem-based adaptation (EbA) uses biodiversity and ecosystem services to help people adapt to the effects of climate change; it should form part of a national strategy. As EbA becomes a popular response to the linked challenges of climate change and poverty in developing countries, it is useful to set out criteria for assessing the effectiveness of EbA programmes:¹

- 1) Does the initiative allow communities to maintain or improve their adaptive capacity or resilience, reduce their vulnerability to climate change, and enhance co-benefits that promote wellbeing?
- 2) Does it restore, maintain or enhance ecosystems' capacity to produce services for local communities, and allow ecosystems to withstand climate change impacts and other stressors?

Additionally, effective EbA projects should also be economically viable.

Our research project — 'Ecosystem-based adaptation: strengthening the evidence and informing policy'² — looked at 13 sites globally to discover how effective EbA is, what opportunities for and challenges to implementation exist, and how to overcome the latter. The incentive-based hilsa conservation programme ('the hilsa programme') in Bangladesh is one of these study sites (see Box 1). This programme's planning and implementation did not consider climate change. However, as with many natural resource management initiatives, significant adaptation benefits emerged, so the programme can be reflected on and measured through the frame of EbA.

Does the programme support adaptation?

In terms of the first criteria of EbA effectiveness, the hilsa programme is likely to have led to catch increases, which — alongside programme

The hilsa programme provides lessons about issues that influence EbA implementation in Bangladesh

incentives (such as rice and support for alternative livelihoods) — have strengthened local adaptive capacity.³ This is particularly true for fishers — one of the poorest groups in Bangladesh — but the

national importance of hilsa means improvements to adaptive capacity will be felt more widely. However, certain fishers have also been negatively affected more than any other group, specifically by restrictions to their catch. So other, less vulnerable,

stakeholders in the fishing industry may have experienced relatively greater improvements in adaptive capacity (mostly through greater income from hilsa catch increases). Improvements in adaptive capacity were widespread with few trade-offs in terms of where they accrued; these could be long-term if the programme is continued.

In common with projects that more consciously apply an EbA approach, social co-benefits emerged from the hilsa programme, including: disaster risk reduction, more diverse livelihoods and improvements in food security. The co-benefits also contributed indirectly to building adaptive capacity. Programme incentives provide clear, immediate short-term benefits to complement longer-term benefits (catch increases), demonstrating how 'payments for ecosystem services' can provide a model for securing finance and support for EbA where

regulation alone might fail. But, as with increases to adaptive capacity, social co-benefits relating to higher incomes may have benefited others in the fishing industry more than the most vulnerable fishers, despite efforts being made to reach them.

While efforts were made to build local knowledge into the hilsa programme and to make the design and implementation stages participatory, the planning process was largely top-down. Greater community involvement could have improved planning and implementation, and secured greater improvements in adaptive capacity.

Beyond over-exploitation, a number of factors threaten local ecosystem resilience and hilsa catch levels. The most notable of these is climate change (although impacts remain unclear, see 'Overcoming the challenges' section), but shifts in water flow and river morphology (the shapes of channels and how they develop), overfishing and pollution could all lead to tipping points in hilsa production. However, little is known about when or how this might occur. The large area over which hilsa migrate, across national borders, also creates a management challenge. But it is likely that the programme has delivered increased ecosystem resilience and service provision (namely hilsa catch levels), and so meets our second criteria of EbA effectiveness. The benefits are potentially long-term if the programme continues and the large area over which hilsa migrate becomes a positive: it means ecosystem benefits extend far beyond programme implementation sites.

Box 1. Evolution of the incentive-based hilsa conservation programme^{6,7,8,9}

The hilsa is a migratory species that completes its life cycle in both the ocean and in some of Bangladesh's freshwater river systems. The hilsa fishery is Bangladesh's largest single-species fishery, employing half a million professional fishers; and an additional 2.5 million people are engaged in part-time fishing activities or in the supply chain. The hilsa fishery contributes 1% of the country's GDP and accounts for 11% of total national fish production. Around 250 million Bengali people depend on hilsa for nutrition.

Bangladesh's hilsa production began fluctuating in the 1970s, mainly due to overfishing and habitat degradation. A sharp decline in the early 2000s fuelled fears about the collapse of the fishery, prompting the Department of Fisheries to establish the Hilsa Fisheries Management Action Plan in 2003. The plan:

- Declared five sanctuary sites in important nursery areas to reduce pressure on hilsa juveniles
- Established four nationally important spawning grounds, covering 6,900km²
- Introduced a fishing ban in the four spawning grounds for 11 days (recently extended to 22 days) each October
- Enforced the Protection and Conservation of Fish Act 1950 (for example, banning nets likely to catch juveniles)
- Offered lost-earnings compensation to fishers affected by the ban: affected households (initially 186,000, increasing to 224,000 by 2016) received 30kg (later increased to 40kg) of rice each month through the government's Vulnerable Group Feeding Programme. Households were provided with support for alternative livelihoods to reduce vulnerability (such as sewing, livestock and poultry rearing, and net making) and improved access to microcredit
- Sought to generate awareness of and support for the bans, through boat rallies, mass media, leaflet distribution, posters and involving public representatives in management interventions.

The incentive-based hilsa conservation programme is the vehicle for implementing the Action Plan.

The Department of Fisheries also introduced an Act in 2003 specifically to protect juvenile hilsa: it bans all activities related to catching, transporting, marketing, selling and possessing juveniles between 1 November and 31 May (subsequently the catch ban was extended to the end of June).

Is the programme economically viable?

The financial costs and benefits of the hilsa programme vary for different stakeholders; for government, they were accrued in different departments, but overall the expense of running the incentive scheme was more than offset by increased export tax revenue. It is unclear whether the programme is of overall financial benefit to fishers — compensation may not have covered losses from fishing restrictions and the programme caused some unintended negative economic impacts (mostly localised). Losses may have been partly offset by catch improvements, which created broad economic benefits felt throughout Bangladesh.

Implementing EbA: challenges and enablers

The hilsa programme was not designed to include adaptation targets, but its outcomes suggest that it can effectively address climate change impacts by meeting our first and second criteria of EbA effectiveness. Beyond this, the hilsa programme has provided lessons about policy, institutional and capacity-related issues that influence programme implementation — and EbA implementation more generally — in Bangladesh.

Local barriers. At the ‘upazila’ (local, sub-district) level, insufficient capacity, technical skills, human resources, logistical support and funds all presented key barriers to implementing the hilsa programme. The same factors hinder EbA initiatives in general. Corruption, weak governance and a lack of transparency were further serious challenges, along with weak local institutions and (at times) weak leadership. Inadequate cooperation between institutions and departments was problematic for management, implementation and policy support; for example, between local law enforcement agencies, the Bangladesh Fisheries Research Institute, Department of Fisheries and other relevant organisations. Community-based natural resource management is not sufficiently supported, and limited formal financial services are

available to help address high levels of fisher poverty and indebtedness.

National barriers. Inadequate government policies — particularly relating to fisheries, climate change and EbA itself — make EbA implementation difficult. There is no policy or strategy for addressing climate change impacts in the fisheries sector and fisheries policies lack long-term planning. There is no explicit national-level policy or strategy that recognises and facilitates EbA implementation in Bangladesh. Knowledge gaps relating to hilsa biology and behaviour, social issues relating to hilsa management and the impact of climate change on fisheries in Bangladesh are key challenges. Decentralisation is lacking and fisher associations receive little support — it is very hard for local voices to reach higher levels of policy and planning. Insufficient capacity and resources and too few opportunities to market hilsa proved challenging for hilsa programme implementation. Links between the various agencies involved in hilsa management are weak and government tends to prioritise economic growth (with associated industrial effluent and waste dumping in riverine ecosystems) over good environmental management. Transboundary collaboration with Myanmar and India to manage hilsa across its entire habitat also needs improvement.

Broad enablers. Implementing the hilsa programme — and EbA in general — is supported by government prioritisation, the presence of appropriate incentives, established local institutions and bylaws, and a number of national-level institutions, policies and legislative instruments to support sustainable fisheries management,⁴ climate change and EbA (although these issues were rarely addressed together).

Scope for sustainability. This particular programme is likely to prove sustainable, in part because it was developed without donor assistance and is already mainstreamed into government structures, policies and processes; however, this means it is dependent on continued government support.

Box 2. Tools to develop the hilsa conservation programme into an adaptation strategy

The hilsa and its freshwater ecosystems are under-researched, as are the impacts of climate change upon them. Freshwater fisheries as an environment are also poorly represented among the tools and methodologies that support EbA (most are designed for generic use) — a stocktake of relevant tools yielded only eight covering ‘inland waters’. However, an easily-searchable ‘EbA Tools Navigator’ is under development.¹⁰ Meanwhile, there are some existing tools that may support further development of the hilsa programme as an adaptation strategy:

- **NAP-Ag Knowledge Tank:**¹¹ tools and resources on climate change adaptation, resilience and disaster risk reduction in agricultural sectors (including fisheries) to support National Adaptation Plans (NAPs) and adaptation planning
- **Soil and Water Assessment Tool (SWAT):**¹² a small watershed to river basin-scale model to simulate the quality and quantity of surface and ground water and predict the environmental impact of land use, land management practices and climate change
- **Toolkit for Ecosystem Service Site-Based Assessment (TESSA):**¹³ guidance on low-cost evaluation of the natural benefits from all land-based and wetland habitats, to generate information that can influence decision making.

Overcoming the challenges

To date, there has been little consideration of how climate change impacts hilsa management or of the possible application of EbA. To address this, BCAS, IIED and the Department of Fisheries hosted a workshop in May 2017: 'Scenario planning of adaptation of freshwater fisheries to climate change with emphasis on ecosystem-based adaptation and biodiversity conservation'. Workshop participants — a broad range of relevant government and NGO stakeholders and researchers⁵ — identified EbA as one of the most useful tools for managing freshwater ecosystems and biodiversity for livelihoods in the context of climate change in Bangladesh. When the workshop participants identified adaptation strategies, those with most potential are related to EbA (such as increasing freshwater flow through transboundary agreements and establishing more sanctuaries and nurseries).

However, a range of challenges to establishing EbA as a powerful tool in Bangladeshi fisheries management remain. To overcome these, we recommend the following actions for national government:

- **Develop policies and strategies for sustainably managing aquatic ecosystems and fish biodiversity that also respond to climate change.** Fisheries and conservation policies need 'climate proofing', and the application of EbA approaches requires support in the fisheries sector (see Box 2). In addition, specific policies are needed to address climate change impacts in the fisheries sector.
- **Polymakers support adaptation by replacing current fisheries management and public waterbody leasing policies with ecosystem- and community-based fisheries management systems.** Ecologically critical waterbodies should cease to be leased out and long-term leasing elsewhere can prevent 'dewatering' at the end of the tenure (catching fish by completely emptying the waterbody and

so destroying all biodiversity). Greater fisher involvement in fisheries management — including in the hilsa programme — could improve sustainability and ensure programmes do not disadvantage vulnerable households.

- **Change national policy in complementary areas.** For example, support for ecosystem restoration, effective law enforcement, dredging to increase habitat connectivity, more seasonal fishing bans, alternative community livelihoods, opening sluice gates during fish breeding periods, banning dewatering and reducing dependency on open freshwater resources. Support for community savings systems or credit schemes is also necessary — these remain novel in the context of sustainable fisheries management that addresses climate change.

Our research also points to the need for **further research into how climate change will affect freshwater habitats, fish biodiversity and the people dependent on them.** This should also explore which strategies will deliver successful adaptation. For example, scenario planning approaches applied under the 'Ecosystem-based adaptation: strengthening the evidence and informing policy' project found that by 2030, heatwaves, decreased winter water levels, changes in the timing of rainfall, higher monsoon flooding and sea level rise could significantly affect aquatic ecosystems and fisheries in Bangladesh (although local-level impacts remain largely uncertain). Research should be conducted by consortia including universities and the government-funded Bangladesh Fisheries Research Institute. International organisations like IIED and WorldFish could help design the research and publish findings.

Hannah Reid, Md Liaquat Ali, Md Monirul Islam and Charlotte Hicks

Hannah Reid is a research consultant at IIED. Md Liaquat Ali is a senior fellow at the Bangladesh Centre for Advanced Studies. Md Monirul Islam is a research fellow at the Interdisciplinary Centre for Conservation Science, Department of Zoology, University of Oxford. Charlotte Hicks is senior technical officer at the UN Environment World Conservation Monitoring Centre (UNEP-WCMC).



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Contact

Hannah Reid
hannah.reid@iied.org

80–86 Gray's Inn Road
London, WC1X 8NH
United Kingdom

Tel: +44 (0)20 3463 7399
www.iied.org

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Notes

¹ Reid, H, Seddon, N, Barrow, E, Hicks, C, Hou-Jones, X, Kapos, V, Rizvi, AR, Roe, D and Wicander, S (2017) Ecosystem-based adaptation: question-based guidance for assessing effectiveness. IIED, London. <http://pubs.iied.org/17606IIED> / ² IIED, Ecosystem-based approaches to climate change adaptation. www.iied.org/ecosystem-based-approaches-climate-change-adaptation / ³ Reid, H and Ali, L (2018) Ecosystem-based approaches to adaptation: strengthening the evidence and informing policy. Research results from the Incentive-based Hilsa Conservation Programme, Bangladesh. IIED, London. <http://pubs.iied.org/17625IIED> / ⁴ For example, the Protection and Conservation of Fish Act (Act No. XVIII of 1950), the Marine Fisheries Ordinance (Ordinance No. XXXV of 1983) and the Protection and Conservation of Fish Rules (1985) have been amended to accommodate the fishing bans and sanctuary establishment in riverine and marine areas. / ⁵ Participants' expertise extended across knowledge of freshwater fish, climatic shocks and stresses in freshwater areas, environmental policy and legislation, fisheries policy and legislation, the seventh Five Year Plan (2016–2021), SDGs for Bangladesh, adaptation, EbA and biodiversity conservation. / ⁶ Islam, MM, Mohammed, EY and Ali, L (2016) Economic incentives for sustainable hilsa fishing in Bangladesh: An analysis of the legal and institutional framework. *Marine Policy* 68: 8–22. / ⁷ Dewhurst-Richman, N, Mohammed, EY, Ali, ML, Hassan, K, Wahab, MA, Ahmed, ZF, Islam, MM, Bladon, A, Haldar, GC, Ahmed, CS, Majumder, MK, Hossain, MM, Rahman, A and Hussein, B (2016) Balancing carrots and sticks: incentives for sustainable hilsa fishery management in Bangladesh. IIED, London. <http://pubs.iied.org/16619IIED> / ⁸ Haldar, GC and Ali, L (2014) The cost of compensation: Transaction and administration costs of hilsa fish management in Bangladesh. IIED, London. <http://pubs.iied.org/15522IIED> / ⁹ Mohammed, EY and Wahab, MA (2013) Direct economic incentives for sustainable fisheries management: the case of Hilsa conservation in Bangladesh. IIED, London. <http://pubs.iied.org/16527IIED> / ¹⁰ By UNEP-WCMC, see: www.iied.org/call-for-feedback-inventory-tools-support-ecosystem-based-adaptation / ¹¹ FAO, Integrating Agriculture in National Adaptation Plans (NAP-Ag). www.fao.org/in-action/naps/knowledge-tank/background-and-focus/en/ / ¹² SWAT, Soil & Water Assessment Tool. <https://swat.tamu.edu/> / ¹³ TESSA, Toolkit for Ecosystem Service Site-Based Assessment. <http://tessa.tools/>