Briefing

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Policy pointers

Nepal's policymakers could make significant progress in tackling climate change by scaling up ecosystem-based adaptation (EbA) in federal, provincial and local development and adaptation planning, and by providing the necessary budget.

The institutions involved in planning and implementing EbA will need to embed participatory approaches and collaborate effectively if the effort is to succeed.

Government and donors should support programmes to boost the capacity of Nepal's local, provincial and federal government to implement EbA.

Researchers can play their part in helping to propagate EbA in Nepal by growing the evidence base supporting the approach — including cost benefit analysis — and exploring 'payments for ecosystem services' and other ways to incentivise implementation.

Ecosystem-based adaptation: the key to addressing climate change in Nepal

All governments in developing countries face the challenge of addressing climate change impacts and identifying the best ways to help their people adapt, with ecosystem-based adaptation (EbA) an increasingly popular response. Research in Nepal suggests that EbA approaches can 1) boost community adaptive capacity or resilience, 2) help ecosystems produce services for local communities and withstand climate change impacts and other stressors, and 3) be financially and economically viable. Despite EbA's potential in Nepal, a number of policy, institutional and political obstacles to implementation remain. This briefing explores these challenges and identifies opportunities and priorities for scaling up EbA.

Ecosystem-based adaptation (EbA) approaches make use of biodiversity and ecosystem services to help people adapt to climate change, as part of an overall strategy. They are an increasingly popular response to the linked challenges of climate change and poverty in developing countries.

Positive findings from a recent initiative assessing the effectiveness of EbA suggest that policymakers should consider scaling up the approach to tackle climate risks in Nepal. The initiative — Ecosystem-based adaptation: strengthening the evidence and informing policy[1] — looked at 13 EbA sites around the world, with an additional focus on learning how challenges can be overcome. The Ecosystem-based Adaptation in Mountain Ecosystems project — otherwise known as the Mountain EbA Project — in Nepal (Box 1) was among them.

The efficacy of EbA can be assessed according to three main criteria:[2]

1) **Adaptive capacity and vulnerability:** does an EbA initiative allow communities to maintain or improve their adaptive capacity or resilience? Does it reduce their vulnerability to climate change, while enhancing co-benefits that promote wellbeing?

2) **Ecosystem resilience and services:** does an EbA initiative restore, maintain or enhance the capacity of ecosystems to continue to produce services for local communities? Does it allow ecosystems to withstand climate change impacts and other stressors?

3) **Economic viability:** is an EbA initiative financially and economically sustainable?

People first

Experience from the Mountain EbA Project in Nepal demonstrates that the approach can be an excellent way to help people adapt to climate change impacts and hence meet the **first criteria** of EbA effectiveness.

Changes in climatic patterns were already quite noticeable in the Panchase region of Nepal when the project was implemented in 2011, and where temperatures have been increasing. In terms of

precipitation, the frequency of rainfall events has decreased but the intensity of monsoon rainfall has increased. Local communities have also observed a reduction in snowfall, with the snowline shifting upwards.

Experience from Nepal shows that EbA can be an excellent way to help people adapt to climate change impacts

Examples of improvements in adaptive capacity under the project include:

- The restoration and conservation of more than 60 community ponds and 45 water sources/natural springs buffered the community against flooding, drought and landslides, and provided a sustainable water supply for households and agriculture, even during dry periods
- More than 1,000 households improved their livestock sheds (to collect urine and improve farmyard manure) so less water is needed in the farmyard, which helps during droughts
- Soil management interventions and 'climate smart' farming practices increased the resilience of agriculture ecosystems and improved the community's capacity to cope with climate change risks. Increases in productivity and farm income, along with savings made from reducing external inputs, reduced vulnerability
- Crops were selected with climate change in mind; for example, drought-resistant seed varieties provided food during droughts

Box 1. The Mountain EbA Project in Nepal[3]

The Mountain EbA Project was implemented in Nepal, Uganda and Peru between 2011 and 2016, with funding from Germany's Federal Ministry for Environment, Nature Conservation and Nuclear Safety. The project's main objective in Nepal was to enhance decision makers' ability to plan and implement EbA strategies and measures at the national and ecosystem level, through various pilot activities. EbA measures implemented under the project included:

- Maintaining and restoring ecosystems through agroforestry, forest resource conservation, and plantations of fodder and forage species and broom grass, particularly by roads to reduce landslides
- Restoring wetlands, springs and ponds to ensure year-long water supplies
- Enhancing soil health and increasing crop productivity and soil moisture during dry periods, using integrated soil nutrient management (promoting the use of organic compost dung and animal urine, and better livestock shed management), vegetable seed distribution and training on integrated plant nutrient systems and organic farming
- Strengthening homestay businesses to diversify livelihoods and build local people's resilience to climate change.

Key project partner institutions included: United Nations Development Programme, UN Environment, International Union for Conservation of Nature, Ministry of Forest and Soil Conservation, Ministry of Population and Environment, district government authorities, two local non-governmental organisations, Panchase Protected Forest Council and 17 Village Development Committees in the Panchase Protected Forest area.

- Broom grass and timur (bamboo-leaved prickly ash) cultivation restored hillsides and reduced landslide risk. Broom grass plantations also protected roads (and thus access to markets) and provided communities with an alternative source of income
- Forest management activities diversified livelihoods, reduced water-induced disasters and protected rural infrastructure
- Commercialisation of plant products diversified livelihoods
- Project awareness raising and capacity building activities — such as EbA learning groups, exchange visits, establishment of an information centre, training and awareness raising on different issues, events and radio broadcasts — helped improve understanding and capacity around EbA and sustainable natural resource use.

The people whose resilience and adaptive capacity improved were among the most vulnerable to climate change: mountain communities (targeted by the project), women and also poor, vulnerable, young and indigenous groups. Since homestay businesses are largely run by women, they tend to benefit most from homestay-related interventions.

Some social groups experienced bigger improvements in resilience and adaptive capacity than others, but these did not come at a cost for others. Similarly, although it took time for some of these gains to materialise, they were not associated with short-term costs. There may, however, have been trade-offs in terms of where gains in adaptive capacity, resilience or vulnerability occurred — notably between upstream and downstream areas.

Many social co-benefits emerged from the project, including the provision of sustainable water and livelihoods; improved social cohesion; disaster risk reduction and increased security; market access; health improvements for livestock and people; food security; reduced conflict over resources; climate change mitigation; enhanced traditional and cultural customs; and knowledge generation.

As with adaptation benefits, some social groups (notably women and other particularly vulnerable groups) may have accrued more of these social co-benefits than others, but not at a cost to the others.

Project activities incorporated local and indigenous knowledge, and many of the participatory approaches that were adopted supported community agency and leadership. It was very clear that these participatory processes were an important factor in improving adaptive capacity.

Ecosystem resilience and service provision

Mountain ecosystems are particularly vulnerable to climate change and the Panchase region is no exception. To improve ecosystem resilience, the project purposefully adopted a landscape approach at the sub-watershed level. These ecosystem-related boundaries, however, did not align with administrative boundaries and local governance structures, so the project had to work with more than one Village Development Committee.

The project led to improved ecosystem resilience in Panchase and various kinds of ecosystem services (provisioning, regulating, cultural and supporting) were maintained or restored, primarily at the sub-watershed or catchment level and notably in downstream areas. The project therefore met the **second criteria** of EbA effectiveness. Improvements to ecosystem service provision emerged over a range of timeframes and there is reason to hope that they will endure in the long-term. There were, however, trade-offs in terms of where (or for whom) improvements in ecosystem resilience and service provision accrued. For example, improvements downstream were often larger than those noted at the project implementation sites. Crop raiding by monkeys and hares increased in some areas and improvements in water provision sometimes served conservation purposes better than agriculture.

Is EbA cost-effective and economically viable?

A number of formal cost-benefit analyses were conducted on various measures implemented under the project. Results from these show that EbA approaches were cost-effective and compared well with alternatives, thus meeting the **third criteria** of EbA effectiveness. Planting broom grass along newly constructed roadsides and near bioengineering initiatives on degraded and abandoned land, and planting timur on private land, were cost-effective and more profitable than a 'business as usual' scenario and maize planting (an alternative intervention) respectively.[4] Constructing gabion walls with anchoring revegetation along the banks of the Harpan River was also found to be cost-effective.[5]

Although no formal assessments were conducted, project soil management activities, homestay promotion, restoration of conservation ponds and natural springs, and forest management activities were perceived to be cost-effective. An exercise that modelled two approaches to forest restoration that address climate-related threats (performance-based payments for restoration and traditional plantations) showed that both were viable and profitable.[6] Interestingly, the former approach demonstrated significantly better net present values, benefit-to-cost ratios and internal rates of return than the latter, suggesting the need to explore such approaches in the context of future funding for EbA.

A number of broader economic costs and benefits emerged from the various project interventions that were not included in these formal analyses and perceptions of cost-effectiveness. These included additional local level income generation opportunities, productivity benefits from reduced soil erosion and improved market access because roads became more durable.

Some of the financial and economic benefits of the projects took time to accrue, and short-term economic incentives helped overcome the relatively costly transition periods needed to secure these long-term gains.

Policy and institutional challenges and opportunities

Key barriers to implementing EbA at the local, provincial and federal levels include a lack of clarity

Box 2. Tools for valuing ecosystem services and assessing costs and benefits

An EbA Tools Navigator is being developed by the 'ecosystem-based adaptation: strengthening the evidence and informing policy' project in order to make the methods more accessible. The Navigator contains a number of tools — such as those listed below — that support the valuation of ecosystem services and cost-benefit analysis of EbA or other interventions, but experience in Nepal has shown that it can still be a challenge to source accurate, locally appropriate data to feed into such tools, which require technical skills and resources to use.

- 'Managing Coasts with Natural Solutions: Guidelines for Measuring and Valuing the Coastal protection Services of Mangroves and Coral Reefs'[7] provides guidance on valuation in a manner that is consistent with national economic accounts and can be included in other decision-making processes
- The 'Guidance Manual for the Valuation of Regulating Services'[8] assesses different methodologies for valuing regulating services in economic terms
- 'TESSA'[9] (Toolkit for Ecosystem Service Site-Based Assessment) provides information on low-cost methods to evaluate the benefits people receive from nature at particular sites, in order to influence decision making
- 'Economic Approaches for Assessing Climate Change Adaptation Options Under Uncertainty: Excel Tools for Cost-Benefit and Multi-Criteria Analysis'[10] discusses methods and tools for making decisions on climate change adaptation, with two Excel-based tools provided
- 'ValuES: Methods for integrating ecosystem services into policy, planning, and practice'[11] is an online platform that analyses approaches to assessment and valuation, identifies best practice and hosts an inventory of methods, tools and indicators
- 'InVEST'[12] (Integrated Valuation of Ecosystem Services and Trade-offs) is a set of models that can be used to quantify, map and value the benefits provided by ecosystems in biophysical or economic terms
- 'Artificial Intelligence for Ecosystem Services'[13] (ARIES) is a software application that supports ecosystem service assessment and valuation, building models of supply and demand.

over the roles and responsibilities of different actors within the young federal democratic structure; a lack of financial and technical resources and implementation capacity; insufficient institutional strength and cross-sectoral institutional collaboration; and some unsupportive policies. Insufficient knowledge was also a problem. For example, the challenges of estimating the monetary values of ecosystem services and environmental resources made cost-benefit analyses difficult. Similarly, sourcing evidence on broader project financial and economic benefits and quantifying them was difficult. The development of EbA indicators remains in its initial stages.

There were, however, a number of policy-, institutional- and capacity-related factors that supported EbA project implementation. At the local level, these included local elected bodies with strong — often legally constituted — institutions such as municipalities, district coordination committees and Community Forest User Groups, and strong local governance. It was crucial to integrate project activities into existing institutions and policies to make sure they were sustainable. EbA 'champions,' and the provision of appropriate short-term incentives, were also important. These incentives, along with strong institutions, were also key for the implementation of EbA at the provincial level.

At the federal level, a range of policies directly or indirectly support EbA. Nepal has a strong policy framework supporting local level adaptation measures, including through Local Adaptation Plans of Action (LAPAs). The Government of Nepal has gradually increased financial resources for tackling climate change, notably at the local level. The Ministry of Forests and Environment coordinates climate change responses in Nepal, and a number of committees and councils help coordinate and guide implementation.

The EbA approach is also being mainstreamed into local, provincial and federal planning processes. For example, EbA has been incorporated into the Panchase Protected Forest Management Plan, LAPAs in the Panchase area, the National Strategic Framework for Nature Conservation, the National Forest Policy and Forest Sector Strategy. EbA approaches are also included in university and school curricula.

Next steps

For EbA to fulfil its potential in Nepal, it will need to be further integrated into the federal, provincial and local development agendas and backed by sufficient government funds. The National Adaptation Plan of Nepal is currently being finalised and should make EbA a priority. New provincial-level plans, policies and strategies related to climate change and adaptation are also needed, and these should highlight EbA approaches.

It will also be crucial to raise awareness and build capacity to implement EbA approaches. The various institutions working on adaptation at federal, provincial and local levels must deepen their collaboration, and protected area managers and planning officers, in particular, will need training to help them mainstream EbA into their plans and government programmes.

EbA works best with community involvement and more efforts are therefore needed to embed participatory approaches into any broader planning and implementation initiatives.

Researchers should also conduct further cost-benefit analyses of key EbA options to help raise awareness of the approach among policymakers and practitioners. Box 2 provides some existing tools for valuation and cost-benefit analysis, but new quantitative tools for effective measurement should also be developed.

The Mountain EbA Project has shown the importance of providing short-term incentives to overcome the cost of the transition periods needed to secure long-term gains from EbA. Approaches involving 'payments for ecosystem services' have a long history in Nepal and some policy and legislative support. These, and other possibilities, should be explored to find the best ways to scale up EbA.

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Notes

[1] IIED, Ecosystem-based adaptation: strengthening the evidence and informing policy. www.iied.org/ecosystem-based-adaptation / [2] Reid, H, Seddon, N, Barrow, E, Hicks, C, Hou-Jones, X, Rizvi, AR, Roe, D and Wicander, S (2017) Ecosystem-based adaptation: question-based guidance for assessing effectiveness. IIED, London. / [3] UNDP (2015) Making the Case for Ecosystem-Based Adaptation: The Global Mountain EbA Programme in Nepal, Peru and Uganda. / [4] Kanel, K (2015) Cost-Benefit of EbA Interventions: Case Studies from Panchase Project Area. Cost Benefit Analysis Report. Government of Nepal, United Nations Development Programme, Kathmandu. / [5] Kanel, K (2015) Grey Green Structures as Treatment to Climate Induced Disasters: A Cost Benefit Analysis of Grey Green Structures. Government of Nepal/United Nations Development Programme, Kathmandu. / [6] IUCN Nepal (2014) Forests Restoration Payment for Economic Growth and Environment Sustainability: A Cost and Benefit Analysis. / [7] Waves, Managing Coasts with Natural Solutions. www.wavespartnership.org/sites/waves/files/kc/Technical%20Rept%20WAVES%20Coastal%202-11-16%20web.pdf / [8] UNEP, Guidance Manual for the Valuation of Regulating Services. http://wedocs.unep.org/bitstream/handle/20.500.11822/8003/Guidance_Manual_for_the_Regulating_Services.pdf?sequence=3&isAllowed=y / [9] TESSA, the Toolkit for Ecosystem Service Site-based Assessment. http://tessa.tools/ / [10] Adaptation Community.net, Economic Approaches for Assessing Climate Change Adaptation Options Under Uncertainty. www.adaptationcommunity.net/?wpfb_dl=144 / [11] ValuES, Counting on Nature's Benefits. www.aboutvalues.net/ / [12] The Natural Capital Project, Integrated Valuation of Ecosystem Services and Tradeoffs. http://naturalcapitalproject.stanford.edu/invest/ / [13] ARIES, Artificial Intelligence for Ecosystem Services. http://aries.integratedmodelling.org/

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