



Ecosystem-based Approaches to Adaptation in National Policy: A case study from Nepal, Peru and Uganda

DRAFT

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Key messages

- 1. Climate change and adaptation plans and policies in Nepal, Peru and Uganda recognize the importance of ecosystem management, conservation and restoration in helping people to adapt.**
- 2. Ecosystem-based approaches to adaptation were included in national development plans, indicating their contribution to broader development goals and economic growth.**
- 3. Environmental and sectoral policies often fail to refer to ecosystem-based approaches to adaptation. Sectoral policies require updating.**
- 4. A cross-sectoral vision should be adopted for delivering ecosystem-based approaches to adaptation**
- 5. The full potential of benefits for adaptation in the planning and implementation of commitments under all Rio Conventions should be embraced at national level**
- 6. Cross-sectoral, multi-stakeholder, multi-criteria processes at national level often prioritise actions on the ground around ecosystem-based approaches to adaptation**
- 7. Actions on ecosystem-based approaches to adaptation were mainly in the sectors of agriculture, water, forests and biodiversity conservation. They are, however, also relevant for other sectors such as health, tourism and energy**
- 8. Ecosystem-based approaches to adaptation are often combined with other approaches to adaptation such as hard infrastructure and institutional strengthening.**
- 9. Ecosystem-based approaches to adaptation should be integrated into local and regional level development plans to deliver community-driven actions on the ground at the ecosystem scale.**
- 10. Further research on ecosystem-based approaches to adaptation is required. The scientific case for ecosystem-based approaches should be linked to solid, downscaled vulnerability and impact assessments.**

Introduction

The urgency to adapt to the impacts of climate change is growing, especially in developing countries. Existing coping strategies to deal with climate variability, as well as new and enhanced adaptation approaches are required. The role of ecosystems in adaptation is recognized at the international level under the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD). Given the urgency of adaptation and often limited funding, available and cost-effective adaptation solutions are often prioritized. Ecosystem-based approaches to adaptation, or the conservation, sustainable management, and restoration of ecosystems to help people adapt to the impacts of climate change are gaining increasing attention, as they are accessible to the rural poor in developing countries and can be cost-effective. Such approaches include, for example, sustainable agriculture, integrated water resource management, and sustainable forest management interventions that use nature to reduce vulnerability to climate change.

This paper provides an overview of international policy on ecosystem-based approaches to adaptation and of initial research on integrating such approaches into national policies and plans, including NAPAs. It then assesses whether and how international policy guidance on ecosystem-based approaches to adaptation has been integrated into national level development, climate change and sectoral policies in the case study countries of Nepal, Peru and Uganda. Finally, lessons learned are identified. The paper focuses on reviewing policies, rather than in-depth analysis of political economy considerations, for example around governance issues. It is also limited to a few case studies. It is hoped that the findings will provide initial insights into potential ways as to how ecosystem-based approaches to adaptation can be integrated into country-level policy making and implementation.

Ecosystem-based approaches to adaptation in international policy

The Rio Conventions provide international policy guidance for countries to implement and enhance action around sustainable management, conservation and restoration of ecosystems for climate change adaptation of both biodiversity and people, and to integrate such approaches into their policy frameworks. There are also opportunities for identifying and promoting synergies in the delivery of these Conventions around adaptation.

A first set of decisions address the need for ecosystems to adapt in the face of climate change. The UNFCCC includes this in its objectives (Box 1). CBD decisions refer to managing ecosystems to maintain their resilience to climate change¹ and the 10-year strategic plan of the UNCCD (2008–2018) has an objective to reduce the vulnerability of affected ecosystems to climate change.

A second set of references focuses specifically on how ecosystem management, and the goods and services provided by ecosystems, can enable people to adapt to the impacts of climate change. CBD provides a definition for Ecosystem-based Approaches to Adaptation, whilst the UNFCCC Cancun Adaptation Framework invites Parties to enhance action on adaptation through sustainable management of natural resources (Box 2). This kind of adaptation is the focus of the German Government-funded UNEP/UNDP/IUCN partnership programme on Ecosystem Based Adaptation in Mountain Ecosystems. It is this approach that will be explored in the country case studies below.

Box 1. Promoting ecosystem resilience to allow adaptation

*“The ultimate objective of this Convention ...is to achieve... stabilization of greenhouse gas concentrations in the atmosphere ... should be achieved within a time frame sufficient to **allow ecosystems to adapt naturally to climate change.**” Article 2. UN Framework Convention on Climate Change*

¹ Including Decisions VII/15, VIII/30 and X/33

Box 2. Ecosystem-based approaches to adaptation

*“Ecosystem-based approaches for adaptation: (j) Recognizing that **ecosystems can be managed** to limit climate change impacts on biodiversity and **to help people adapt** to the adverse effects of climate change; implement where appropriate, ecosystem-based approaches for adaptation, that may include **sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy** that takes into account the multiple social, economic and cultural co-benefits for local communities.”* Decision X/33, Para 8, CBD.

*“Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework, [...] by undertaking, inter alia, the following: (d) **Building resilience of socio-economic and ecological systems, including through economic diversification and sustainable management of natural resources.**”* FCCC/CP/2010/7/Add.1, Para 14.

Ecosystem-based approaches to adaptation in national plans and policies in developing countries

Climate change is a cross-cutting issue and should be mainstreamed across policy domains. Current research on integration of ecosystems within national policies relevant to adaptation has been carried out primarily in two areas: 1) Comparative analysis of NAPAs and their integration of ecosystems and natural resource management; 2) Analysis of how a particular natural resource sector (e.g. water, forests) has been integrated into development, climate change and sectoral policies at country level.

NAPAs under the UNFCCC support Least Developed Countries (LDCs) in identifying priority activities to respond to immediate and urgent climate change adaptation needs. **Several LDCs have recognized the role that ecosystems can play in helping people adapt to climate change in their prioritized NAPA projects.**

56% of priority NAPA projects reviewed by Reid et al (2009) had significant natural resource components. In certain countries (Cape Verde, Eritrea, Sudan, Solomon Islands and Vanuatu) every NAPA project had a strong natural resource component, whilst each NAPA had at least one project with a natural resource component. Initial work by Pramova et al (2010) looked specifically at the integration of Ecosystem-based Adaptation in the NAPAs and found that 68% of the NAPAs have at least one reference to ecosystem services. Stucki et al (2010) estimated that 42% of NAPA project profiles include ecosystem restoration as an adaptation component.

The majority of NAPA activities that recognize the role of ecosystem management in adaptation have been in the agricultural sector and around food security, followed by coastal zone management, forestry and water management. NAPAs have further recognized the importance of promoting ecosystem resilience to allow ecosystems themselves to adapt. Several NAPA projects had a strong conservation component involving protected areas, natural wetlands or preserving relatively undisturbed ecosystems. Ethiopia, Laos, the Republic of Guinea and Sierra Leone have three or more such priority projects (Reid et al, 2009). Natural resource components have also been included in disaster risk reduction, health and energy sectors. A key challenge for NAPAs is how and if these are integrated into national policy and how, and whether, the prioritized activities are actually implemented in practice.

Another set of research has explored how natural resource management and adaptation, including priorities identified in NAPAs, have been integrated into national policies. This academic literature has focused in particular on water and forests. Such research has usually included ecosystem-based approaches to adaptation as one component of their research, alongside mitigation policies and hard infrastructure.

Ecosystem-based adaptation approaches in water and forest management have often been overlooked in national sectoral, climate change and development policies. Pittock (2011) analyzed conflicts, synergies and trade-offs in national climate change relevant policies with regards to sustainable water management in nine countries². With respect to developing countries, the analysis found that climate change policies proposed a diverse array of water-related climate adaptation, from significant infrastructure and supply-led approaches to those that focus on restoration of the natural sources of water. No and low regrets measures – such as restoration of floodplains to manage floods – have, however, largely been overlooked. In terms of forests, Nkem et al (2007) found that Poverty Reduction Strategy Papers (PRSPs) and national development plans often fail to recognize the importance of tropical rainforests for livelihood adaptation. Research by Björklund et al (2009) found that there is a clear disconnect between activities identified in NAPAs around water management on the one hand, and water resource management policies at country level on the other, including plans relating to other Multilateral Environmental Agreements and PRSPs.

A more harmonized approach to adaptation policy (including with regards to ecosystems) requires, amongst others, cross-sectoral policy development, inclusion of key actors from high-level ministries, and multi-stakeholder approaches³. The above research findings will be further explored in the country case studies below.

An analytical framework for assessing national policy

This analysis builds on OECD Policy Guidance (2009) on integrating climate change adaptation into policy cycles, in particular into **national and sectoral strategies and policies**. A range of adaptation relevant policies, including national development plans, climate change and adaptation policies, sectoral policies, national action plans to combat desertification (UNCCD NAPs), national biodiversity strategies and action plans (NBSAPs), and regional climate change plans⁴ were reviewed.

The OECD identifies stages in the policy cycle in which adaptation can be integrated. This analysis focuses on the Policy formulation stage, which includes incorporating keywords in visions, strategies and policies at national level, which are then integrated into sectoral plans and policies to guide decision-making. It then addresses the Planning stage, which includes climate change adaptation activities, programmes and projects that are identified in line with the objectives set at the policy formulation stage.

This analysis first assesses the extent to which policies include **key word references and incorporate ecosystem-based approaches to adaptation in strategies and policies**. The following key words were used as references for the concept of ecosystem-based approaches to adaptation: “ecosystems”, “biodiversity”, “conservation”, “sustainable management” and / or “restoration” – combined with “adaptation” of “people/livelihoods/communities”. The second step identifies which **actions, or concrete activities and programmes, on ecosystem-based approaches to adaptation** are put forward in the plans and policies.

This research then analysed **actions** on ecosystem-based approaches to adaptation **against key sectors: agriculture, forestry and water**. These categories were based on research showing that natural resources and ecosystem services have been integrated into NAPAs primarily under these sectors (Reid et al, 2009; Pramova et al, 2010; Stucki et al, 2010)⁵. A sector on **biodiversity conservation** was also included to account for all activities focused on promoting ecosystem resilience to allow ecosystems to adapt. A further category for any other sectors was added. Finally, lessons learned between country case studies are identified.

This paper provides an introductory analysis of how ecosystem-based approaches to adaptation have been integrated into national policy in Nepal, Peru and Uganda. These countries were chosen to represent vulnerable mountain (and other) ecosystems in three continents. The countries vary in terms of development. Peru ranks 80 on the Human Development Index (HDI), with Nepal ranking 157, and Uganda 161. They are

² Australia, Brazil, China, EU, India, Mexico, South Africa, Tanzania and the United Kingdom

³ Pittock et al, 2011; Nkem et al, 2007; Schipper et al, 2006

⁴ Regional Climate Change Strategies were only available for Peru.

⁵ Coasts were not included as a category, given both Nepal and Uganda are landlocked countries

countries where the Ecosystems and Livelihoods Adaptation Network⁶ and the BMU funded UNEP/UNDP/IUCN partnership programme on Mountain Ecosystem Based Adaptation are being implemented⁷. Additional brief country case studies are provided in boxes for cross-tabulating findings.

Country Case Studies: Nepal, Peru and Uganda

Policy formulation: Ecosystem-based approaches to adaptation in visions, policies and strategies

A first step of analysis included reviewing policies in Nepal⁸, Peru⁹ and Uganda¹⁰ to assess whether they included references to ecosystem-based approaches to adaptation in their visions, objectives, policies and strategies and/or in their actions¹¹. Policies were chosen based on relevance for the research and access, and included: national development plans; national climate change policies; national adaptation plans, incl. NAPAs; regional climate change and adaptation plans (only available in Peru); sectoral policies (especially those related to natural resource management); national environmental policies; NBSAPs; NAPs and disaster management plans.

Table 1. Policies with references relevant for ecosystem-based approaches to adaptation

Country	Policies reviewed	Policies with references to ecosystem-based approaches to adaptation
Peru	18	11
Nepal	17	6
Uganda	16	5

⁶ ELAN is a partnership between CARE, IIED, IUCN and WWF. For More information, please visit <http://www.elanadapt.net/>

⁷ For more information, please visit

<http://www.unep.org/climatechange/adaptation/EcosystemBasedAdaptation/EcosystemBasedAdaptationinMountainEcosystems/tabid/51980/Default.aspx>

⁸ The following policies and plans were reviewed for Nepal: Three-Year Plan approach paper; Climate Change Policy; NAPA; National Communication to UNFCCC; National Action Programme on Land Degradation and Desertification; Nepal's Readiness Preparation Proposal REDD; NARC's Strategic Vision for Agricultural Research; Poverty Reduction Strategy Paper Environmental Policy and Action Plan; Nepal Biodiversity Strategy; The National Strategy for Disaster Risk Management in Nepal; Forest Sector Policy; Leasehold forestry policy; National Water Plan; Water Resources Strategy; National Wetland Policy; National Conservation Strategy

⁹ The following policies and plans were reviewed for Peru: Action Plan on Adaptation and Mitigation to Climate Change National Climate Change Strategy; National Biodiversity Action Plan; Second National Communication; National Research Agenda on Climate Change 2010 – 2021; Bicentenary Plan; Adaptation Strategy for Rio Mayo; Adaptation Strategy for Rio Santa; Adaptation Strategy for Rio Piura; Regional Climate Change Policy Arequipa (proposal); Regional Climate Change Policy Lambayeque; Regional Climate Change Policy Junin; Regional Climate Change Policy Loreto (proposal); National Policy and Strategy on Water Resources; National Environment Policy; National Action Plan for the Environment; National Action Programme to Combat Desertification; National Forestry Strategy

¹⁰ The following policies and plans were reviewed for Uganda: National Development Plan; NAPA; National Communication to UNFCCC; Water Policy; Agriculture Sector Development Strategy and Investment Plan; National Action Plan to Combat Desertification and Drought; National Biodiversity Strategy and Action Plan; National Policy for Disaster Preparedness and Management; Wetlands Policy; Wetland Sector Strategic Plan; Wildlife Policy; Forestry Policy; Plan for Modernisation of Agriculture; REDD Readiness Preparation Proposal; National Environment Management Policy; National Environment Action Plan

¹¹ As mentioned above, the following key words were used as references for the concept of ecosystem-based approaches to adaptation: "ecosystems", "biodiversity", "conservation", "sustainable management" and / or "restoration" – combined with "adaptation" of "people/livelihoods/communities".

Analysis of policies referring to ecosystem-based approaches to adaptation

All countries had **references to ecosystem-based approaches to adaptation in their climate change and**

Box 3. National Policies with Respect to Ecosystem-based approaches to Adaptation

Nepal Climate Change Policy – Objective: *“to enhance the climate adaptation and resilience capacity of local communities for optimum utilization of natural resources and their efficient management”*. (p 5-6)

Peru Bicentenary Plan - Objective: *“Conservation and sustainable use of natural resources and biodiversity using an integrated and ecosystem approach for an environment that enables good quality of life for people and healthy, viable and functional ecosystems in the long term”*, under which climate change adaptation approaches should also be implemented. (p. 247, unofficial translation)

Uganda National Development Plan - Priority intervention for climate proofing development: *“Implement NAPAs with a focus on building community and ecosystem’s resilience to adverse impact of climate change”* (p. 316)

adaptation policies and plans, as well as in their national development plans (Table 1.).

Peru included most references, in 11 out of the 18 reviewed policies. Peru has the most comprehensive set of national climate change policies, including a National Climate Change Strategy, an Action Plan and a Research Agenda; and at local level Regional Climate Change Strategies and River-basin level adaptation strategies. In addition, ecosystem-based approaches to adaptation are referred to in the Bicentenary Plan on National Development. In Nepal, references were included in the Climate Change Policy, NAPA, National Communication and the Three-Year Plan Approach 2010-2013, which provides overall planned development for Nepal. For Uganda, the National Development Plan, the National Communication and NAPA included

references to ecosystem-based approaches to adaptation (Box 3.).

Ecosystem-based approaches to adaptation should be integrated into local and regional development plans to deliver community-driven actions on the ground at ecosystem scale.

In Peru, each regional government is required to develop a Regional Climate Change Strategy, which so far have been finalized for four regions¹². These strategies enhance decentralization of adaptation planning and provide an opportunity for more detailed and localized adaptation planning across sectors. All current Regional Climate Change Strategies in Peru refer to ecosystem-based approaches to adaptation, such as agroforestry for adaptation. Peru also has three river basin-level adaptation strategies, which have been developed through cross-sectoral, multi-stakeholder processes with the aim of being integrated with regional development plans. These plans have a strong focus on integrated water resource or coastal zone management as management approaches for adaptation. Nepal has recently initiated a process for developing Local Adaptation Plans of Action (LAPAs), which will provide a good opportunity for integrating ecosystem-based approaches to adaptation.

Ecosystem-based approaches to adaptation are seen as relevant components of climate change policy at all levels in the three countries, as means to enhance resilience of both communities and ecosystems. National Development Plans also recognize the role of ecosystems in helping people adapt, indicating that ecosystem conservation and management for adaptation are seen as part of broader sustainable development, economic growth and poverty reduction. As opposed to the findings by Nkem et al (2007) and UNDP (2009) on water, forests and adaptation not being included in development plans, Nepal, Peru and Uganda did integrate ecosystem-based approaches to adaptation in such plans. Given these are cross-sectoral documents guiding overall national development, this inclusion is significant. For all countries, climate change and adaptation policies were structured to build on and complement one another, therefore the

¹² Amazonas, Arequipa, Junin, Lambayaque

priorities, objectives, visions and actions are synergistic, including with respect to ecosystem-based approaches to adaptation. In these cases, development plans are also aligned with broad objectives around these approaches.

Analysis of policies that do not include ecosystem-based approaches to adaptation

Several national and sectoral policies in the three countries did not integrate ecosystem-based approaches to adaptation. **The National Environmental Policies do not link adaptation and ecosystems.** The National Environmental Policy of Nepal (1993) includes no reference to climate change. The National Environment Policy for Uganda (1994), on the one hand, sets an objective to monitor the climate to better guide land-use and economic development decisions, and on the other refers to the need to conserve, preserve and restore ecosystems. However, these two aspects are not linked together and there is no reference to adaptation. The National Environment Policy of Peru (2009) includes both policies on ecosystems, conservation and human well-being, as well as on adaptation, but again does not link these together.

Several sectoral policies recognized the importance of ecosystems and ecosystem services for development, but do not mention or integrate this with adaptation. In Nepal, the Agricultural Perspective Plan (1996), the Forest Sector Policy (2000), the Wetlands Policy (2003), Conservation Strategy (1988) and the Biodiversity Strategy (2002) all emphasise the link between biodiversity, ecosystems and human well-being, but do not include references to climate change. The Wetlands Policy (1996), Wetland Sector Strategic Plan (2001), Wildlife Policy (1999) and Forestry Policy (2001) in Uganda all recognise the link between ecosystems, ecosystem services and development, as well as biodiversity values, but do not mention adaptation. The National Forestry Strategy of Peru (2002) acknowledges that sustainable management of forests and rural development are intrinsically linked, but the policy has no references to climate change.

At international level, the Rio Conventions (UNFCCC, CBD and UNCCD) all recognised the importance of ecosystems for adaptation. At national level NAPAs, National Communications, NBSAPs and NAPs mention the importance of linkages between these conventions. However, in the case study countries, the NBSAPs and NAPs tend to not fully recognise the links between biodiversity conservation, land degradation and desertification, and adaptation. The NAP of Peru, the NBSAP of Nepal, and the NBSAP and NAP of Uganda do not mention adaptation. The NAP of Nepal has only one action on updating climate change effects on grasslands and wildlife habitat. Peru's NBSAP is the only one of the reviewed NAPs and NBSAPs to more comprehensively address the issue, by having a strategic objective on assessing the impacts of climate change on biodiversity. **Emphasis must be given at national level to embracing the full potential of benefits for adaptation in the planning and implementation of commitments under all Rio Conventions.**

Disaster Management Strategies do not link disaster risk management with ecosystems or adaptation.

The National Strategy for Disaster Risk Management in Nepal and the National Policy for Disaster Preparedness and Management in Uganda do not refer to adaptation, nor do they recognize ecosystem management as a means to also reduce the impacts of disasters. Ecosystem-based approaches to adaptation are associated with disaster risk reduction and in many cases, such approaches can reduce vulnerability to both climatic and non-climatic disasters¹³.

Climate change overall was not yet on the development agenda when most sectoral policies were formulated. When looking at climate change policies and sustainable water management in 9 countries, Pittock et al (2011) found that biodiversity policies, and to a lesser degree water policies, were often out of

¹³ Andrade et al, 2010.

date and drafted when the full scale of climate change impacts hadn't been understood. Most sectoral policies in this research that did not refer to ecosystem-based approaches to adaptation are around 10 years old, whilst some more recent sectoral policies, including the Nepal the Strategic Vision for Agricultural Research (2010), the National Policy and Strategy on Water Resources of Peru (2009) and the Ugandan Agriculture Sector Development Strategy and Investment Plan 2010/11 – 2014/15, do indeed include references to ecosystem-based approaches to adaptation. The climate change policies, which all included references, are recent, as are the National Development Plans.

Delivering priorities on ecosystem-based approaches to adaptation will entail working at an ecosystem level and across sectoral boundaries. This **will require mainstreaming into sectoral policies and regional development plans as to enable implementation of ecosystem-based approaches to adaptation across sectors at ecosystem scale**. This will entail understanding and managing multiple demands on natural resources and negotiating trade-offs.

National Adaptation Plans are being discussed under the UNFCCC as means to identify medium- and long-term adaptation needs, and to develop and implement strategies to address these. These Plans would build on the experience of the NAPA process, which focused on short-term adaptation needs. In a submission of its views on the National Adaptation Plans¹⁴, Nepal has already indicated that the NAPs should take into consideration vulnerable ecosystems, complement cross-sectoral approaches and be coherent with existing plans such as NAPAs, NBSAPs and UNCCC NAPs. **The National Adaptation Plans that are currently being discussed under the UNFCCC could provide an opportunity to further promote cross-sectoral, ecosystem approaches to adaptation.**

Policy planning: Ecosystem-based approaches to adaptation in activities, projects and programmes

A second analysis of policies and plans assessed whether concrete actions were put further around ecosystem management, conservation and restoration to help people adapt. **Actions were included in the climate change policies and the development plans** for Nepal, Peru and Uganda, as well as in **some sectoral policies**. For the purpose of this analysis, actions were seen as including prioritised adaptation measures, lists of activities and project profiles. These actions were then categorised for each country under the following key sectors: agriculture; water; forests; biodiversity conservation; and a category for any other sectors that may arise (Table 2).

National adaptation programmes and plans identify priority actions on adaptation, many of which are around ecosystems and adaptation. National adaptation programmes and plans were particularly comprehensive in putting forward a list of adaptation actions. Nepal (in 2010) and Uganda (in 2007) both have NAPAs, whilst Peru has a National Action Plan on Adaptation and Mitigation (2010). Out of the 9 priority project profiles in Nepal's NAPA, 4 include strong ecosystem components. In Uganda, the number is higher with 6 out of the 9 priority projects including at least some activities around ecosystems and adaptation. The Peru National Action Plan has 21 projects of national priority, of which 12 have a focus on ecosystems and adaptation. There is also one priority project profile which builds directly on the concept of ecosystem-based adaptation.

The plans are interesting not only in that they prioritise ecosystem-based approaches to adaptation, but also that **this prioritization has often been reached through cross-sectoral, multi-stakeholder, multi-criteria processes**. In Nepal, NAPA actions were prioritized based on specific prioritization criteria which

¹⁴ FCCC/SBI/2011/MISC.7

indicate that ecosystem-based approaches came forward because they fill the criteria of having potential to support local livelihoods, build on people's participation, be cost-effective and easy to implement. Further, these approaches would provide cross-sectoral benefits. The Uganda NAPA was developed with representatives from several Ministries and using Participatory Rural Appraisal with communities of selected sites.

Main sectors for implementing actions on ecosystem-based approaches to adaptation

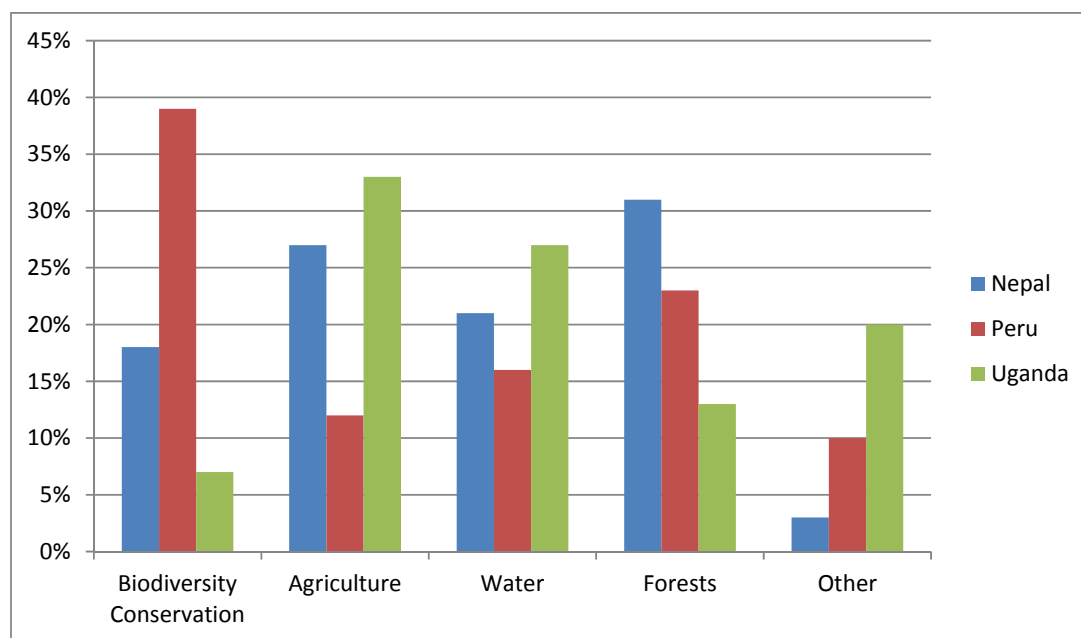
Nepal had a balance of actions across sectors, with most actions in the forest sector (31%), followed by agriculture (27%), water (21%) and biodiversity (18%). Nepal has a forest cover of 39.6% and forestry is a key sector of the economy, contributing at least 9% of GDP¹⁵. Community forestry and multi-stakeholder and multi-actor participation in governance and management of forests has been promoted, providing such additional benefits as poverty reduction and rural employment, as well as for adaptation. Ecosystem-based approaches to adaptation in the forest sector included conservation, sustainable management, agro-forestry and NTFP management for adaptation. In many plans and policies, forests and biodiversity are treated together, which may further explain that many of the identified forest adaptation approaches are ecosystem-based. Further, many of the biodiversity conservation projects focused specifically on forest ecosystems and species.

Peru had the greatest number of actions, 39%, focused in the biodiversity conservation sector around increasing ecosystem resilience to the impacts of climate change. Biodiversity is a priority issue for the country. Peru's vulnerable ecosystems, including mountain ecosystems, are one of the key reasons that make the country and local communities vulnerable to climate change. Increasing ecosystem resilience was often seen as a means to enhance community resilience. Examples of the types of biodiversity conservation activities for adaptation that were put forward include climate modeling impacts on species and ecosystems, strengthening Protected Area systems and maintaining genetic diversity of local seeds.

In Uganda, the majority of actions on ecosystem-based approaches to adaptation were in agriculture (33%) and water (27%), whilst there was only one action on biodiversity conservation. The approaches that were put forward under water were often cross-sectoral between water and agriculture, for example promoting water conservation for better agricultural production. Given the importance of agriculture to the economy, with 80% of the population employed in this sector, it is not surprising that the majority of ecosystem-based activities fall in the agriculture and water sectors. It is also interesting to note that the relevant sectoral policies, the Water Policy and the Agriculture Sector Development Strategy, both have cross-sectoral objectives that encompass the importance of sustainable management of water and agriculture for adaptation of livelihoods.

¹⁵ Nepal's Readiness Preparation Proposal 2010, pages 31 and 34

Table 2. Actions on ecosystem-based approaches to adaptation per sector in Nepal, Peru and Uganda



Almost all actions in Nepal, Peru and Uganda on ecosystem-based approaches to adaptation fell into the natural resource management sectors of agriculture, water and forests or under biodiversity conservation. In Nepal, there was one action in the energy sector, and in Peru and Uganda a couple of actions in the tourism sector, around wildlife and ecosystem conservation for tourism as alternative means of livelihoods under a changing climate. Peru also had a few actions on integrated coastal zone management. The relatively high number of actions (20%) in the “other” sector in Uganda were cross-sectoral approaches to ecosystem management.

Implementing ecosystem-based approaches to adaptation

Activities on ecosystem-based approaches to adaptation are already being implemented in case study countries. Many on-going adaptation activities build on existing coping strategies, which, especially for natural resource dependent rural poor, are often around ecosystem management and conservation. Peru’s National Action Plan on Adaptation and Mitigation lists both planned and on-going projects. For example, the project “Adapting to Increasingly Receding Glaciers in the Andes” has a strong focus on promoting ecosystem resilience for adaptation. Ecosystem-based approaches to adaptation are being promoted in on-going projects on sustainable land management, as well as on integrated and adaptive management in high Andes river basins. In Nepal there are on-going projects on forests and livelihoods with an adaptation angle, whilst in Uganda there are projects around sustainable management of water resources in a changing climate. A new programme on Ecosystem-based Adaptation in Mountain Ecosystems, supported by BMU, is being implemented in Nepal, Peru and Uganda. On-going activities on ecosystem-based approaches to adaptation are taking place in several countries, such as Tanzania (Box 7). Many of these activities relate to the priorities identified in the NAPAs, although it appears that the majority of the priority NAPA project profiles have yet to receive funding.

Box 6. Integrating Ecosystem-based Approaches to adaptation with other approaches in India and Bangladesh

India and Bangladesh have mainstreamed ecosystems and adaptation into overall climate change strategies. India's National Action Plan on Climate Change was developed in 2008 to identify measures that both promote development objectives whilst providing co-benefits for climate change. Out of the eight National Missions, four integrate components of biodiversity conservation and ecosystem-based approaches to adaptation alongside other approaches. The National Water Mission integrates conservation of wetlands as a key aspect alongside management of surface and ground water resources. The National Mission for Sustaining the Himalayan Ecosystem is largely focused on ecosystem-based approaches to adaptation. The National Mission for a Green India has an objective to increase forest cover and density, as well as to conserve biodiversity. The National Mission for Sustainable Agriculture includes methods to conserve soil and water and agroforestry, together with methods such as insurance and biotechnology.

Bangladesh is one of the first Least Developed Countries to develop a comprehensive National Climate Change Strategy and Action Plan (2009), which is hence a cutting edge document. Out of 6 key pillars, the pillar on infrastructure includes developing coastal green infrastructure in an adaptation programme against future cyclones and storm surges. Under research and knowledge management, there is a specific programme on monitoring of ecosystem and biodiversity changes and their impacts, to *"understand ecosystem dynamics and their implications for biodiversity changes and adaptation strategies"*. India and Bangladesh provide examples of how ecosystem-based approaches to adaptation can be combined with other adaptation approaches, but also with mitigation and development approaches.

Integrated approaches to managing ecosystems at a landscape scale for adaptation, across sectors, were found in all countries. For example, in Uganda sustainable land management for adaptation is given priority in NAPA project profiles and in the Agriculture Sector Development Strategy. In Peru, especially local level Regional Climate Change Strategies and River Basin Adaptation Strategies prioritized integrated water resource and integrated coastal zone management. In Nepal, the priority NAPA project is on integrated management of agriculture, water, forest and biodiversity sectors, by using several ecosystem-based approaches to adaptation.

In many cases, ecosystem-based approaches to adaptation are combined with other approaches to adaptation such as hard infrastructure and institutional strengthening. For example, the Uganda NAPA project profile on Water for Production combines rainwater harvesting and water reservoirs in Protected Areas with dams for providing water for local populations. The Nepal NAPA project profile on Promoting Community-based Adaptation through Integrated Management combines ecosystem-based approaches with institutional strengthening and early warning systems. Box 6 provides further for examples of combined approaches from India and Bangladesh.

Box 7. Ecosystem-based approaches to adaptation in Tanzania

Tanzania's NAPA (2007) identifies on-going activities on adaptation, many of which are around ecosystems and adaptation and across several sectors. Examples include: forestry (e.g. conservation of forest biodiversity, water catchment and soil fertility), water (e.g. IWRM), coastal and marine resources (e.g. conservation programmes), wildlife (e.g. wildlife management) and tourism (e.g. wildlife corridors in National Parks). The sectors are also similar to the ones for ecosystem and adaptation activities in Nepal, Peru and Uganda.

Further research on ecosystem-based approaches to adaptation is required. A lot of uncertainty remains including with regards to the likely impacts of climate change on ecosystems and ecosystem services. Peru's National Research Agenda on Climate Change identifies the need for further research on evaluating, predicting and reducing climate change impacts on biodiversity and ecosystems. Nepal's National Communication calls for ecological research to study climate change impacts on species, landscape management and natural regeneration. The scientific case for **ecosystem-based approaches should further be linked to solid and downscaled vulnerability and impact assessments** that support informed decision making and action on the ground. Vulnerability and impact assessments of ecosystem services are essential to understanding comprehensively the impact of climate change and proposing adaptation actions that increase socio-ecological resilience¹⁶.

Box 8. Ecosystem-based approaches in adaptation policies in Colombia and the EU

Colombia has approved an Institutional Strategy for the Coordination of Policies and Actions on Climate Change in July 2011 that aims to enable cross-sectoral planning and implementation of climate change actions. The strategy outlines the objectives for a National Plan on Adaptation, a living document that is being developed. Objective 8 of a National Plan on Adaptation focuses specifically on identifying actions for natural adaptation, ecosystem-based adaptation and evaluating their cost-efficiency. The Strategy also provides a definition for ecosystem-based adaptation.

The EU White Paper "Adapting to climate change: Towards a European framework for action" sets out to provide a strategic approach to reduce the EU's vulnerability to climate change. The White Paper identifies a set of actions for the EU and Member States, including "*promot[ing] strategies which increase the resilience to climate change of health, property and the productive functions of land, inter alia by improving the management of water resources and ecosystems*". Green infrastructure is believed to enable adaptation, for example by "*improving the soil's carbon and water storage capacity, and conserving water in natural systems to alleviate the effect of droughts and to prevent floods, soil erosion and desertification*". The White Paper shows that ecosystems are as relevant for adaptation in developed as they are in developing economies

Conclusions and lessons learned

This research focused on three vulnerable countries with mountain ecosystems, Nepal, Peru and Uganda. These countries recognized the importance of ecosystem management, conservation and restoration to increase socio-ecological resilience and help people adapt, thereby including such considerations in their climate change and adaptation policies. Inclusion of ecosystem-based approaches to adaptation in national development plans further indicates that such approaches can contribute to broader development goals, poverty reduction and economic growth.

Environmental and sectoral policies in natural resource management failed to refer to ecosystem-based approaches to adaptation, even if they do recognize the importance of ecosystem management for broader human well-being and development. Emphasis must also be given at the national level to embrace the full potential of benefits for adaptation in the planning and implementation of commitments under all Rio Conventions. Currently, the NBSAPs and UNCCD NAPs failed to integrate adaptation. Climate change overall was not on the development agenda when most environmental and sectoral policies were formulated, many being about 10 years old. These policies will require updating.

¹⁶ Andrade et al, 2010

A cross-sectoral vision should be adopted for delivering adaptation, which emphasizes the importance of cross-sectoral, ecosystem scale interventions and the value of taking an ecosystem-based approach. This will require understanding and managing multiple demands on ecosystems and managing trade-offs. Although this research focused on policy review rather than institutional arrangements, there are cross-sectoral, multi-stakeholder climate change commissions in place in all three countries. It is hoped that these types of arrangements could further enhance planning and implementation of cross-sectoral adaptation action around ecosystems.

It will be critical that ecosystem-based approaches to adaptation are included in local development and natural resource management plans, including through local activities and sub-national government plans and policies, which will ultimately define what actions are delivered on the ground. Integrated approaches to managing ecosystems at a landscape scale for adaptation are a good example of how adaptation can be delivered across sectors. Multiple stakeholders will need to be engaged in planning and implementing these actions.

Ecosystem-based approaches to adaptation were often prioritized as adaptation actions. These came out from cross-sectoral, multi-stakeholder, multi-criteria processes, in particular the process of developing NAPAs in Nepal and Uganda. These approaches can build on people's participation, be cost-effective and easy to implement, and can contribute significantly to local livelihoods, especially of natural resource dependent rural poor.

Actions on ecosystem-based approaches to adaptation were mainly in the sectors of agriculture, water, forests and biodiversity conservation. Increasing ecosystem resilience was seen as a means to increase community resilience. Ecosystem-based approaches to adaptation are however relevant for other sectors than those focused on natural resource management, such as energy, health and tourism. Such opportunities for action should be explored. In many cases, ecosystem-based approaches to adaptation were combined with other approaches to adaptation such as hard infrastructure and institutional strengthening. This reinforces that ecosystem-based approaches should be seen as part of broader, overall adaptation strategies.

A lot of uncertainty remains with regards to the likely impacts of climate change on ecosystems and ecosystem services. Further research on ecosystem-based approaches to adaptation is required. The scientific case for ecosystem-based approaches should further be linked to solid and downscaled vulnerability and impact assessments that support informed decision making and action on the ground.

Ecosystems and adaptation are increasingly being included in the climate change and adaptation policies of least-developed countries like Nepal, Uganda, Tanzania and Bangladesh; middle-income countries such as Peru and Colombia; emerging economies like India; and developed countries like the EU (see boxes 6, 7 and 8). Better integrated, cross-sectoral approaches to policy formulation, supported by multi-stakeholder institutional arrangements and adequate funding, will be critical in ensuring the delivery of effective, sustainable solutions on the ground that enable both ecosystems and people to adapt in a changing climate.

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Acknowledgments: The following people provided valuable inputs to the paper: Angela Andrade, CEM; Carina Bachofen, IUCN; Edmund Barrow, IUCN; Pauline Buffle, IUCN; Nella Canales, CARE; Doris Cordero, IUCN; Gretel Gambarelli, IUCN; Pascal Girod, CARE; Daniela Göhler, BMU; Sophie Kutegeka, IUCN; Musonda Mumba, UNEP; Barbara Nakangu, IUCN; Peter Neil, IUCN; Caroline Petersen, UNDP; Joanna Phillips, WWF-UK; Carolina de la Rosa, CARE; Nik Sekhran, UNDP; Karen Tscherning, GIZ, in addition to other colleagues at UNDP, UNEP and IUCN.

Disclaimer: The views and opinions expressed are not necessarily those of UNEP, UNDP, BMU, IUCN or ELAN

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