



THE SOCIAL DIMENSION OF ECOSYSTEM-BASED ADAPTATION



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EXECUTIVE SUMMARY

Successful ecosystem-based adaptation (EbA) necessitates the creation of an enabling environment for implementation and, to this end, an embedding of EbA in the broader policy landscape (environmental, economic and social), the provision of adequate (financial and political) support, and a strengthening of local capacities via guidance, knowledge and best-practice sharing and increased political support. Successfully establishing this socially-conscious framework for implementation will support a transition towards a green economy and therewith deliver increased security and improved community well-being. Furthermore, such framework will be helpful to achieve the SDGs and MDGs, addressing local communities' world-wide.

The purpose of this paper is to address and raise awareness of the social dimension of ecosystem-based adaptation (EbA) to climate change, laying particular emphasis on: i) the social impacts of EbA on global national and regional level and local communities and ii) social considerations in designing and implementing EbA. By highlighting appropriate methods and measures by which these issues can be



The purpose of this paper is to address and raise awareness of the social dimension of ecosystem-based adaptation (EbA) to climate change

addressed, the paper will provide information to facilitate successful EbA implementation and thereby the delivery of the expected benefits for local communities as well as for the authorities coping with climate change-related challenges and nature protection issues.

Insights will be drawn from relevant literature and studies as well as from the on-site experiences of practitioners

from around the globe. On this basis, recommendations for policy makers will be provided on how to best pursue EbA in the future considering different social factors and the diverse (in particular social) benefits EbA can generate and its ability to simultaneously address multiple policy objectives and societal challenges.



1

Introduction

The world is in a state of economic, social and environmental change, which has not previously been experienced. Society is facing the enormous challenge of dealing with poverty alleviation and social and gender inequality, climate change, biodiversity loss and ecosystem degradation against a background of a financial crisis and recession in significant portions of the global economy. Beyond this, an increasing human population (estimates indicate the potential for ca. 9 billion people by 2050¹), food and water insecurity, energy supply shortages and an unsustainable rate of resource consumption are foreseen for the future. The challenges we face are therefore complex and require the achievement of multiple objectives and goals at several geographical levels in parallel, including; climate stability through greenhouse gas emissions reduction; the maintenance of our essential 'life support systems' (ecosystem services); the development of a sustainable economic model (the so-called 'green economy'²) as well as the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) (taking effect in 2015).

Recognizing this context, the ecosystem approach has risen to the forefront of discussions as one proven and promising path for tackling the

1 According to the medium variant of the UN's 2010 Revision of World Population Prospects.

2 In short, "the green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. Green economy is an economy or economic development model based on sustainable development and a knowledge of ecological economics". URL: <http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/29784/Default.aspx>

aforementioned challenges [1]. The Convention on Biological Diversity (CBD) defines the ecosystem approach as "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Humans, with their cultural diversity, are an integral component of ecosystems."³ More specifically, ecosystem-based adaptation (EbA) is considered as "an approach that help to build resilience and reduce the vulnerability of local communities to climate change" [2]. While EbA has already been recognized for its tremendous potential⁴, substantial issues remain, including its thorough integration into relevant international and national policies and strategies.

An important feature of EbA as compared to other approaches is the pursuit of not only environmental and adaptation benefits, but also of social benefits for the local community including vulnerable groups, such as women, youth and indigenous people (e.g. increases in income, diversification of jobs, educational opportunities and gender equality). Thus, the social dimension needs to be taken into account when developing and implementing ecosystem-based approaches to climate change adaptation. Such actions also encompass the design of supporting policies and policy instruments.

3 *The Ecosystem Approach.* <http://www.cbd.int/ecosystem/>

4 <http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/29784/Default.aspx>



2

Social impacts of ecosystem-based adaptation

While EbA can target specific social or environmental impacts, one of its strengths is in the ability to maximize synergies between multiple environmental, economic and social goals simultaneously. With regards to social benefits, properly implemented EbA projects have the potential to deliver benefits for local communities including food security, shelter, risk reduction, freshwater and medicine supply, and local climate regulation [3]. At a national, regional and local scale, EbA can enhance socio-economic development via the generation of employment and alternative livelihood opportunities. Such benefits are of particular importance to vulnerable populations lacking basic shelter and sanitation and having a limited ability to relocate or access surrogate income sources.

BOX 1: INCREASING ECOSYSTEM RESILIENCE TO PROVIDE SOCIAL BENEFITS

The community-based coastal habitat restoration project 'Green Coast' in Indonesia, Sri Lanka, Thailand, Malaysia and India restored and sustainably managed damaged coastal ecosystems as a means to restore livelihoods and increase resilience to the impacts of climate change. In addition to producing significant environmental benefits, the project increased the resilience of 91,000 people in the coastal regions. By providing financial and technical support to communities to explore alternative livelihood activities, the project facilitated an increase in the income for over 12,000 households (from e.g. fishing, small scale aquaculture, eco-enterprises, home gardening and animal husbandry activities).

The Working for Water Programme in South Africa implements EbA via the replacement of water intensive invasive alien trees with native species [5]. This approach increases the available water supply for agricultural, domestic and industrial usage while also supporting biodiversity and creating livelihood and employment opportunities for the affected communities.

As illustrated in the above examples, the basis of obtaining EbA-induced social benefits rests on maintaining or improving ecosystem resilience and thus ensuring the continued delivery of critical ecosystem services. For example, healthy mangrove forests defend against erosion, stabilize the coastline and protect nearby populations in the event of severe storms. They also serve as nurseries for fishes and a food source for local communities. There are many social benefits and the discussions below showcases this.

FOOD SECURITY

Climate change has the potential to adversely impact food availability and the stability of food supplies by altering their ecological foundation, thereby indirectly impacting food access and its utilization [6]. Given that provisioning services serve to maintain food supplies and regulating and supporting services underpin society's ability to produce sufficient food

resources, maintaining a high level of ecosystem health is thus fundamentally important for food security. Ecosystem-based adaptation therewith offers a means by which basic food needs can continue to be met while also minimizing negative tradeoffs for the environment. For example, a heavy dependency of agricultural fields on fertilizer could lead to severe nutrient leaching and downstream water quality issues like eutrophication. EbA therefore promotes systems based on agroforestry, conservation tillage, crop diversification, legume intensification. Alternatively, EbA can involve the restoration of fragmented or degraded natural areas to enhance critical ecosystem services such as food and fisheries provision [1] or the conservation of agricultural biodiversity to maintain specific gene pools for crop and livestock adaptation to climate change [5].

LIVELIHOOD IMPROVEMENT

Ranging from the practice of subsistence agriculture to marketing goods or services (e.g. (eco-) tourism), EbA provides a venue for generating increased income via alternative employment and livelihood opportunities, acquiring new skills and accessing opportunities for social mobility through increased income and personal empowerment [7]. Achieving these social benefits ultimately results in an improved resilience of the people that most intimately depend on natural resources, especially the poor communities [8]. For example, shifting from excessive fishing and sea cucumber harvest to seaweed and sea bass cultivation and home garden improvement, the Kudawa village in Sri Lanka transitioned from unsustainable exploitation practices to the sustainable management of natural resources [9]. In Malmö, Sweden, using natural solutions (e.g. drainage ponds, green roofs and green spaces) to create sustainable urban drainage systems helped the inhabitants adapt to the increasing floods linked with climate change while simultaneously delivering socio-economic benefits. As a result of the implemented adaptation measures, unemployment in the area fell from 30% to 6% and the turnover of tenancies decreased by 50%, indicating increased financial security and improved livelihoods of local stakeholders [10].



BOX 2: WOMEN'S EMPOWERMENT IN THE FACE OF CLIMATIC VULNERABILITY

In Bangladesh, many women are economically dependent on their husbands and are not involved in decision-making processes surrounding disaster response. The SHOUHARDO community-led duck rearing initiative aimed to change this situation by educating women not only about agricultural techniques, but also about the risks and impacts of natural disasters. The project ultimately empowerment to the participants via increased incomes as well as improved food security during heavy rain and flooding periods. Many village residents have since raised the foundations of their houses to protect against floods [11].

The Maya Nut Institute works actively in Latin America to help empower women, as they are the main link between families and the environment. Since beginning their activities in 2001, the Institute has helped over 600 rural and indigenous women to form autonomous businesses to produce and market Maya Nut products and act as multipliers for other regions. The initiative has raised family incomes, improved women's self-esteem and increased the awareness of and efforts to conserve the rainforest areas from which the nut stems [12].

3

Contribution to MDGs, SDGs and a green economy

EbA is a promising pathway towards establish a green economy [13]. By maintaining healthy ecosystems and increasing their resilience, EbA preserves the economic values of natural resources and utilizes these natural capitals to alleviate climate change impacts and poverty. In this context, EbA increases vulnerable groups' ability to adapt and cope with foreseen climate change impacts. This underlying mechanism is in accordance with the core of a green economy, which amplifies the contribution of natural capital to economic and social development.

As a cost-effective, integrative approach, EbA's aforementioned benefits (e.g. maintaining ecosystem health, increasing food security and diversifying livelihood opportunities) directly contribute to achieving

the Millennium Development Goal (MDGs) 1 and 7 - 'to eradicate extreme poverty and hunger' and 'ensure environmental sustainability'. EbA, if properly implemented, will also indirectly improve gender equity (goal 3) and human health (goals 5 and 6).

EbA increases vulnerable groups' ability to adapt and cope with foreseen climate change impacts.

Environmental sustainability is gaining increasing attention as a result of the negative impacts of climate change and environmental degradation being experienced globally. The Sustainable Development Goals (SDGs) build on the achievements and lessons of the MDGs and give environmental objectives a higher profile alongside the poverty-reduction objectives in the MDGs. Although the specific SDGs are yet to be established, they will certainly aim for sustainable development - both economically, environmentally, and socially. EbA delivers these multifaceted benefits (see Section 2) and thus serves as a critical tool to achieve these goals.

The graphic below summarises the different social impacts of ecosystem-based adaptation activities, which were discussed in the previous sections.

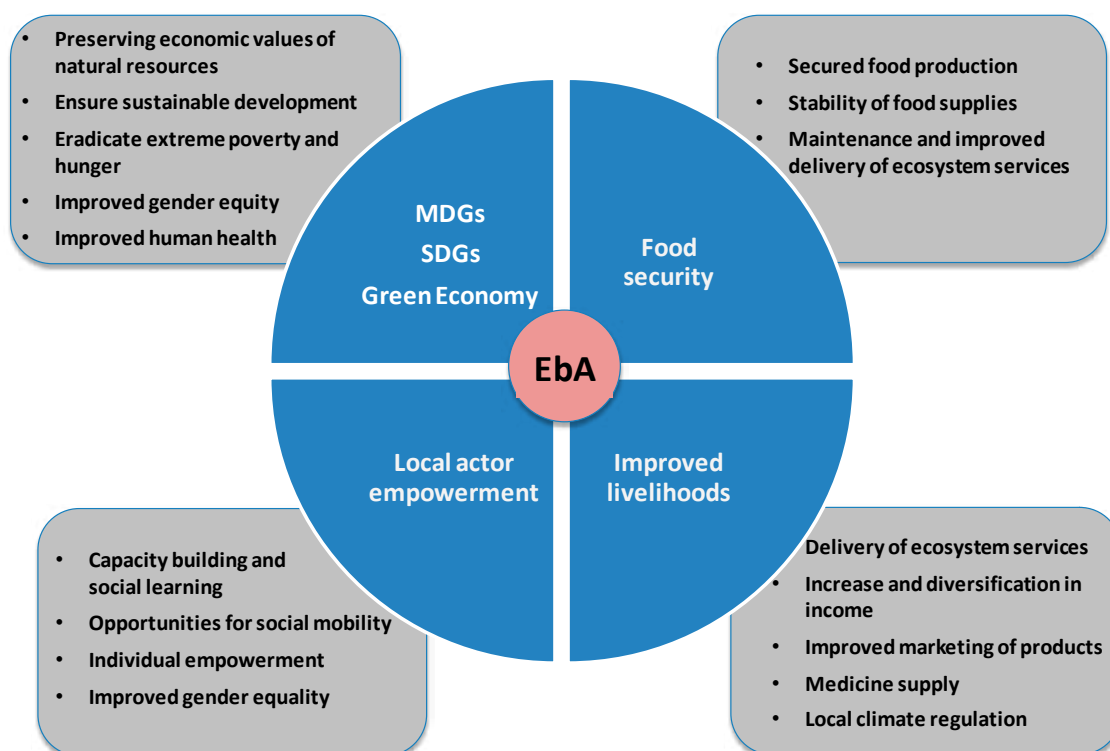


Figure 1: Social impacts of ecosystem-based adaptation (EbA) on national and, regional level and local communities

4 Social considerations in designing and implementing EbA

There are several aspects linked to the design and implementation of EbA on-site (e.g. awareness of the problem and potential solutions, local needs and level of knowledge) as well as within a wider context (e.g. representation of the local population and their needs in political processes), which determine the context and potential for designing and implementing ecosystem-based approaches to adaptation.

PUBLIC AWARENESS AND PERCEPTION

The extent to which the local community and policy makers are aware of climate change and its impacts vary greatly among regions, as do people's degree of direct dependency on natural resources for sustaining

their livelihoods. Often, people may notice changes in climate such as differences in rainfall patterns resulting in changes to production or the occurrence of natural hazards, but not necessarily link these effects to climate change. The awareness to react to climate change strongly increases with the appearance and risk of natural hazards (flooding events, tsunamis, storms etc.) and can be seen as one of the strongest drivers and motivation for action [14]. The decision on which approach is chosen to respond to climate change (traditional engineered vs. ecosystem-based adaptation or a combination) depends very much on the level of awareness and knowledge about all

available approaches, as well as a pioneer mentality⁵ by local authorities and communities. A strong motivating factor at the local level are the multiple benefits that EbA projects can deliver as compared to grey infrastructure solutions. The Dutch De Doorbraak project, for example, does not only prevent flooding, but also improves access to green space and recreational areas for the local residents in an otherwise urban area [14].

⁵ Individual persons with a good standing in their communities/authorities who are very interested to explore and pursue new innovative solutions can be a strong driver in the uptake of EbA

STATUS AND UPTAKE OF LOCAL AND GENDER KNOWLEDGE

Local communities often have knowledge based on traditional or personal experiences regarding the ability of natural resources to provide for their communities and livelihoods and to regenerate, even under changing conditions [15]. Such knowledge can facilitate the development of adequate solutions to address climate change, in particular using an ecosystem-based approach. However, there might also be cases in which local people are lacking the skills necessary to cope with climate change and to identify adequate opportunities for applying nature-based solutions. Here, capacity building exercises could assist in most effectively integrating local knowledge into the design and planning of EbA. Efforts to increase local capacities and ensure an equal participation of both men and women also enable communities to play a more integral role within decision-making processes and reduces the risk of ignoring traditional local knowledge in the top-down implementation of adaptation measures.

GOVERNANCE PROCESSES AT LOCAL AND REGIONAL LEVEL

As EbA tackles various scales, sectors and stakeholders a multi-governmental approach is needed involving national and regional governments, local communities, private companies and NGOs [16]. The roles and responsibilities of actors involved in the implementation of EbA vary from project initiation, funding and investment, representation of different responsibilities and interests (e.g. in the form of a steering committee), technical implementation and overall project management. In order to deal with the high number of actors, clearly defined roles from the beginning of project conceptualization and simple management structures are required [14].

In some cases, successful implementation is hampered by the inadequacy of a high number of legislative items and procedures in place. The Wallasea Island project⁶ illustrates such regulatory and legislative issues, as multiple formal statements of permission from several different authorities were required in order to proceed with the project [14].

⁶ The aim of the project is to combat the threats from climate change and coastal flooding by restoring the wetland landscape of mudflats and altmarsh, lagoons and pasture. It will also help to offset the historical losses of such coastal habitats elsewhere in England and address ongoing regional flood risks.

In terms of developing ownership for adaptation measures among the local communities, participatory and democratic approaches have been shown to be a key tool in this process. In an UN-led project in Uganda aiming to ensure food production, decision-making power was transferred to farmers, indigenous people, food workers, consumers and citizens. This democratic approach at a small scale⁷ facilitated the development of community-led innovation to adapt to climate change, brought in local knowledge and devolved responsibility amongst the community [17]. The representation and participation of women alongside men in decision-making processes must be ensured, because they not only can act as key drivers in climate change adaptation⁸, but also have extensive experience in the sustainable management of natural resources [18].

LAND USE CONFLICTS

In some cases, implementing EbA may require the utilization or setting aside of large areas (e.g. restoration of ecosystems, rewetting peatlands, flood retention measures), which can restrict traditional land use and can result in the loss of productive land. Such land use conflicts are well-known from nature conservation actions and can act as major barriers for adopting ecosystem-based approaches. To overcome such obstacles, the engagement of affected local communities is required, which – while it can be quite time-consuming - is key to revealing the potential benefits of such projects. Stakeholder involvement and consultative processes serve to identify local needs and develop appropriate solutions to compensate for any potential land use restrictions or loss of productive land.

⁷ Another project in the same UNEP/UNDP Climate Change Adaptation and Development (CC DARE) program was established in Togo, a small dam was rehabilitated for rainwater harvest, using small-scale fiscal stimulus. Improved access to water brought multiple benefits for livelihood improvement of local communities such as brick construction, market gardening and fisheries, etc. A similar rainwater harvest project in Seychelles demonstrated significant reduction for water bills in local schools and led to the formulation of a new bill to include rainwater harvest systems in national building stocks.[15]

⁸ SciDev.Net's Sub-Saharan Africa news desk. <http://www.scidev.net/global/news/women-are-key-drivers-in-climate-change-adaptation-.html>



5

Appropriate methods to address social consideration and success factors

A key factor in maximizing the delivery of benefits in EbA is the implementation of appropriate procedures addressing social considerations. Successful practices include holding open and early consultation processes with relevant stakeholders, analysing local needs and supporting capacity building within the local communities. These aspects are discussed in more detail in this section.

STAKEHOLDER ENGAGEMENT

The involvement of multiple public and private stakeholders in the design and implementation of EbA is necessary given the scope and complexity of such projects. Participation can vary from information provision to active involvement in the design and implementation processes [14,19]. Involving multiple parties, however, necessitates clear and well-articulated management structures to ensure efficient coordination and well organized, accessible information structures. Finally,

sufficient time should be planned for trust-building, feedback and flexibility and capacity building [20]. In summary, factors for effectively engaging stakeholders include inclusiveness and transferral of ownership along with clarity, transparency, flexibility and simplicity in the project design.

LOCAL NEEDS AND GENDER ANALYSIS

Effective adaptation planning should be based on a well-defined local needs analysis, including adopting a gender-balanced perspective and taking account of highly vulnerable groups (e.g. women) in order to better understand and address their specific needs through targeted interventions [21]. In addition to analysing local climate variability and projected future climate change, it is important to take the policy and management context and local development goals into consideration [22]. Integrating local knowledge and perspectives in such an analysis helps to ensure long-

term sustainability by fostering a sense of ownership in the affected populations [23] and tailoring the EbA approach to the highlighted needs. A combined assessment of scientific and social assessments will thus ensure a comprehensive understanding of the local situation and provide a basis for achieving synergies among climate change adaptation and other economic and social goals.

CAPACITY BUILDING AND AWARENESS RAISING

To ensure the long-term sustainability of EbA, it is important to support knowledge and capacity building within local authorities and stakeholders and develop social networking mechanisms to sustain stakeholder interactions [14]. Demonstration through pilot projects involving key driving actors/individuals could be an effective way to multiply local efforts and scale up solutions [1]. In addition, a knowledge management system could be used at a regional level to build

and access best practices and foster conducive conditions for developing EbA [24]. At a national level, in order to cope with the cross-cutting nature of EbA efforts, well-planned institutional structures and related capacity development efforts are necessary. Finally, creating high public awareness more generally can increase public support and foster behavioural changes [25], such as the re-evaluation of business models and increased investments in climate change adaptation programs.

LAND SECURITY AND REGULATION

Climate change adaptation has the potential to evoke land use changes and create associated land use conflicts. For example, preserving natural

forest systems for reduced carbon emission and watershed preservation might lead to the relocation of indigenous people and restrict or limit their access to forest resources. Establishing secure land tenure can help to alleviate such conflicts and provide incentives for local communities to make long-term investments in ecosystem preservation. It is therefore urgent to improve land regulations, incorporating enough flexibility to reassign land rights to accommodate potential land use change which may arise [26]. A particular emphasis should be placed on women in order to enhance their adaptive capacity, as they tend to have limited rights and thus limited access to resources [18].





6 Policy Recommendations and the way forward

The implementation of EbA depends on the availability of resources and an enabling environment, which could be fostered by strong policy support. The following policy recommendations address social considerations that should be taken into account in designing and implementing ecosystem-based approaches to adaptation. Therewith the adoption of EbA approach should be promoted and a wide range of social benefits can be achieved.

- **Strengthen integrated adaptive planning:** EbA should be embedded in a range of current plans, strategies and policies across sectors [14,22]. Special attention to should be given to land security issues and the needs of vulnerable and marginalized groups, including women, indigenous people and youth.
- **Integrate local/community traditional knowledge** into research, planning and implementation processes [16].
- **Engage and empower local stakeholders** when developing adaptation strategies and projects. A participatory and decentralized approach should draw on local (traditional and gender) knowledge and perspectives and also transfer decision-making power and leadership roles. This will instill a sense of ownership and responsibility in local populations and help ensure a project's long-term sustainability [14].
- **Use gender-sensitive tools and strategies** in vulnerability and impact assessments as well as in planning and implementing EbA in order to learn how gender is currently accounted for in existing practices and ensure that gender equality exists in future processes. These efforts include ensuring both genders' access to information, economic resources and education [18,27].
- **Capacity building:** Strengthening the capacities of public and private institutions, all local stakeholders and beneficiaries, and increasing public awareness for climate change actions and potential (ecosystem-based) solutions are among key factors for EbA to achieve successes across various scales of implementation [14]. This includes also building capacity of project managers to deal with the increased (climate change) risk and uncertainty [15].
- **Promote small-scale solutions:** Small-scale, bottom-up approaches have been shown to be more effective and efficient than top-down driven EbA [17]. Small-scale solutions are able to mobilize resources and contributions from local people to co-develop EbA projects and can spur larger efforts to scale up local solutions. Integrated efforts combining large-scale policy interventions with small-scale solutions could greatly improve the effectiveness of climate change adaptation efforts.

- **Evaluate ecosystem services/Analyze costs and benefits** to provide evidence on cost-effectiveness and potential benefits that can be achieved by an EbA-project. Such analysis can serve as a communication tool to pursue EbA among local communities and policy makers [14].

Synergies between climate change adaptation and other economic and social goals have the potential to be achieved via the EbA approach. However, additional actions and supportive local conditions are required to successfully pursue ecosystem-based adaptation at a broad scale. Necessary factors include: adequate and locally accessible financing, exploration of public-private partnerships and payments for ecosystem services, cross-sectoral integration of and investments in EbA as well as an alignment between goals at the national and local levels. There is also a need for effective collaboration between policy makers, local communities, and capacity building organizations as well as the existence of supportive political will.



REFERENCES

1. Munang R., Thiaw I., Alverson K., Mumba M., Liu J., Rivington M. (2011): **Climate change and Ecosystem-based Adaptation: a new pragmatic approach to buffering climate change impacts** [Internet]. *Current Opinion in Environmental Sustainability* 2013, [no volume].
2. Perez, A.A, Fernández, B.H., Gatti, R.C. Eds. (2010): **Building Resilience to Climate Change: Ecosystem based adaptation and lessons from the field**. IUCN: Gland, Switzerland, 2010; pp. 15-16.
3. Mercer, J., Kelman, I., Alfthan, B., Kurvits, T. (2012): **Ecosystem-based adaptation to climate change in Caribbean small island developing states: Integrating local and external knowledge**. *Sustainability* 4; pp. 1908-1932.
4. UNFCCC (2011): **Community-based coastal habitat restoration (Green Coast Project)**. <http://unfccc.int/files/adaptation/application/pdf/13eba.pdf>
5. UNFCCC (2011): **Ecosystem-based approaches to adaptation: compilation of information**. Note by the secretariat.
6. Schmidhuber J., Tubiello FN. (2007): **Global food security under climate change**. *Proceedings of the National Academy of Sciences*, **104**:19703–19708.
7. Hazlewood P., Mock G. (2010): **Ecosystems, Climate Change and the Millennium Development Goals (MDGs): Scaling Up Local Solutions** [Internet]. World Resource Institute; 2010.
8. Jones, H.P., Hole, D.G., Zavaleta, E. (2012): **Harnessing nature to help people adapt to climate change**. *Nature Climate Change*, Volume 2, July 2012: 504-509
9. Colls A., Ash N., Ikkala N. (2009): **Ecosystem-based Adaptation: a natural response to climate change** [Internet]. IUCN
10. Kazmierczak, A. and Carter, J. (2010): **Adaptation to climate change using green and blue infrastructure**. A database of case studies: Augustenborg, Malmö: Retrofitting SUDS in an urban regeneration area. <http://www.grabs-eu.org/membersArea/files/malmo.pdf>
11. CARE Bangladesh (2010): **Chameli Begum’s Story of Livelihood Adaptation: Duck Rearing in the face of Climatic Vulnerability** (See www.careclimatechange.org/files/stories/Chameli_Begum_Duc_%20Rearing.pdf).
12. Maya Nut Institute (2013). **Finding balance between people, food and forests: Empowering communities for ecosystem resilience and food security**. <http://mayanutinstitute.org/>
13. UNEP (2010): **The Role of Ecosystems in Developing a Sustainable “Green Economy”**. *Ecosystem Management Policy Series*. [Internet]. UNEP.

14. Naumann S, Anzaldúa G, Gerdes H, Freligh-Larsen A, Davis M, Berry P, Burch S, (2011): **Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe**. Final report to the European Commission, DG Environment.
15. TNC (2009): **Adapting to climate change: ecosystem-based approaches for people and nature**. [Internet].
16. Vignola, R., Locatelli, B., Martinez, C., Imbach, P. (2009): **Ecosystem-based adaptation to climate change: what role for policy makers, society and scientists**. *Mitigation and Adaptation Strategies for Global Change*. 14: 691-696.
17. Munang, R. and Nkem, J.N. (2009): **Using Small-Scale Adaptation Actions to Address the Food Crisis in the Horn of Africa: Going beyond Food Aid and Cash Transfers**. *Sustainability* 2011, 3, 1510-1516
18. UNFCCC (2013): **Report on the technical workshop on ecosystem-based approaches for adaptation to climate change**. Bonn, 3–14 June 2013. Subsidiary Body for Scientific and Technological Advice. Nairobi work programme on impacts, vulnerability and adaptation to climate change
19. Pretty J. (1995): **Typology of Community Participation, quoted in Bass, S., Dalal-Clayton, B. and Pretty, J. *Participation in Strategies for Sustainable Development* 1994, [no volume]**.
20. Conde C., Lonsdale K., Nyong A., Aguilar I. (2005): **Engaging stakeholders in the adaptation process** [Internet]. Cambridge University Press, Cambridge and New York.
21. Girot, P., Ehrhart, C. and Oglethorpe, J. (2012): **Integrating Community and Ecosystem-Based Approaches in Climate Change Adaptation Responses**.
22. Füssel H.-M. (2007): **Adaptation planning for climate change: concepts, assessment approaches, and key lessons**. *Sustainability science*, 2:265–275.
23. Christie M., Mudge G. (2011): **Applying an Ecosystem Approach in Scotland: a Framework for Action** [Internet]. Scottish Natural Heritage.
24. UNEP (2011): **Sustaining forests: Investing in our common future**. *UNEP Policy Series*.
25. UNEP (2011): **Restoring the natural foundation to sustain a Green Economy: A century-long journey for Ecosystem Management**. *UNEP Ecosystem Management Policy Brief 6-2011*.
26. FAO (2008): **Climate Change and Land Tenure: The Implications of Climate Change for Land Tenure and Land Policy** [Internet].
27. Aguilar, L. (2009): **Training Manual on Gender and Climate Change**, IUCN, UNDP and GGCA, Gland, Switzerland.



www.unep.org/climatechange/adaptation/EcosystemBasedAdaptation/



THANKS FOR READING...

