

Using Ecosystem-Based Adaptation Actions to Tackle Food Insecurity

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Oxfam distributing water in the Horn of Africa during an extreme drought in 2010-2011.

Headlines of late have focused on the worst drought in decades in the United States, Africa, southern Europe, and elsewhere. This has led to a justifiably heightened concern about problems of food security and hunger, especially for Africa. In response, the international prices of maize and soybeans have risen past 2007–2008 peaks, when they fueled food riots in more than 30 countries. With a global population that crossed the 7 billion mark earlier this year and is expected to hit 8 billion by 2025, it is critical to build resilient food systems that can enhance food security and address other numerous challenges like climate change, resource scarcity, and severe ecological degradation. Over the next few decades, Africa’s population¹ is

expected to expand to more than that of China or India, constituting about 23% of the global population by 2050. This will place a huge demand on governments and states to provide sufficient survival opportunities. Ever-increasing populations and changes in eating habits will put further strain on availability and require the doubling of food output over the next 20 years. The recurrent vicious cycle transferring the risks from one generation to another will be difficult to break unless adequate/appropriate measures are put in place. However, the questions as to the type of measures/approaches and strategies required still generate divergent views on the international policy arena. Closer attention to a broader spectrum of options is urgently needed. Approaches that go beyond words into actions with potential for informing and guiding policy practices are imperative and urgently needed. One of these approaches is ecosystem-based adaptation (EbA),²

which has provided flexible, cost-effective, and broadly applicable alternatives for building robust food systems and reducing the impacts of climate change.

Seizing the Opportunity: Putting EbA in the Vision of Enhancing Food Security at Local, National, Regional, and Global Levels

The Global Case for Action

Ecosystem degradation undermines food production and the availability of clean water, among other ecosystem services, thereby threatening human health, livelihoods, and ultimately societal stability. Degradation increases the vulnerability of populations to natural disasters like the Horn of Africa droughts. To meet the food needs of to-

Photo on page 29: A mangrove nursery in the Xai Xai district in Mozambique is a step toward applying EbA approaches.

day and tomorrow, ecosystem services, such as water provision, pollination, and maintenance of soil fertility must be enhanced.³ Farmers rely on soil microorganisms to maintain soil fertility and structure for crop production, and on wild species in natural ecological communities for crop pollination and pest and predator control. At present, the value of these services is not built into the cost of food production. The result is that farmers are not rewarded for stewarding their land for future generations, and food production and distribution are often environmentally damaging. The huge international research project on The Economics of Ecosystems and Biodiversity (TEEB) has drawn attention to the economic benefits of ecosystem services and calculating the costs of biodiversity loss and ecosystem degradation. TEEB's synthesis report (2010) argued that if the goods and services provided by the natural world are not valued and factored into the global economic system, the environment will become less resilient to shocks, risking human lives, livelihoods, and the global economy. Actions to better manage ecosystems for food security include:

- Improve soil management to reduce degradation and erosion, store carbon, retain water, and increase soil fertility. This in turn can yield direct benefits to agricultural productivity and resilience, as well as indirect benefits in the form of higher returns to capital inputs (such as fertilizer and irrigation). One approach to improving soil management is to apply the three principles of conservation agriculture: minimal soil disturbance, permanent soil cover, and crop rotations.
- Improve agro-biodiversity—including plant, animal, fish, and associated biodiversity (and interactions between them)—as this can enhance the efficiency of nutrient and water use, can contribute to the development of pest- and disease-suppressive landscapes, and is important for the maintenance of genetic resources for community and regional food production systems.



iStockPhoto/Aldia Vanni

In a landfill in Maputo, Mozambique, a child looks for food, bottles, and iron to resell.

- Develop programs based on the progress of agricultural science and traditional knowledge, for instance, the International Assessment of Agricultural Knowledge, Science and Technology for development, including better referenced and validated indigenous knowledge.
- Improve capacities of farmers to manage investments and to access new technologies (extension programs, farmer field schools); payment of farmers for environmental services (agricultural labeling, direct payments for conservation/mitigation).

The Local Case for Action

The examples that follow show lessons learned from local actions conducted by local actors targeting various

aspects of adapting food systems to climate change. These can serve to open a window of opportunity in addressing the current food crisis plaguing the continent.

- In the city of Xai Xai, Mozambique, many households were experiencing an average of 4 to 5 months of food shortage every year, affecting mainly fishers. Coupled with the current drought crises and changing climate, this coastal community needed to draw from other sources of food productivity such as the seascape in addressing the need for additional sources of food supply. Against this backdrop, ecosystem-based adaptation approaches were used to address this food insecurity and build resilience of the local communities. The UN Environment Programme (UNEP) with technical backstopping and

financial support helped the Centre for Sustainable Development of Coastal Zones (CDS ZS) and introduced an EbA approach to solve this problem by implementing EbA activities to increase community resilience and to ensure the recovery and the sustainable future use of the mangrove ecosystem. The EbA approaches used were fish farming, crab farming, and mangrove reforestation. These community-based and community-led interventions helped enhance the adaptive capacity, resulting in the establishment of fish ponds and crab growth cages, directly benefiting 98 households (490 people), including 10 households in crab farming, 20 households in fish farming, and 68 households in mangrove reforestation including four that are permanently involved in the mangrove nurseries.

- In Uganda,⁴ ecosystems-based adaptation approaches such as agro-

Families that once were only depending on fishing activity at the sea are now involved in fish and crab farming and they are getting enough for consumption and also selling the fish and crabs they harvest.

forestry, conservation agriculture and integrated nutrient management, and establishment of woodlots as land management practices were some of the interventions used. Projects using the EbA approach have demonstrated that productivity increased at the field level by conserving soil and water, and by using leguminous cover crops (beans), which enhanced biological nitrogen fixation. Conservation techniques also reduced planting

costs by 75% and saved the farmers' time, allowing them to expand into other ventures, which has helped reduce rural poverty. Furthermore, the environment benefited from farmers using fewer chemical fertilizers and pesticides, and soil conditions improved. Local nutrition was improved through the new cropping system of alternating maize with beans, which provided more protein in the diet. In addition, the success of farmers who participated in the project has encouraged other farmers to adopt similar practices.

- In Togo,⁵ ecosystems-based adaptation approaches and hard adaptation approaches, involving excavation, enlargement, reinforcement, and repair of dykes, pipe strengthening, and development of channels to feed the fish pond, were used to rehabilitate two dams. As a result of this rehabilitation project, local communities have an increased



CC Dairy Programme

A Ugandan woman harvesting sweet potatoes through the application of ecosystem-based adaptation approaches.



CC Dare Programme

Local residents in the Xai Xai province in Mozambique dig swampy areas to plant mangroves which will serve as a fish habitat and a harbor for coral reefs.

understanding of the role of plants and forests in conserving water and soil, and have been encouraged to landscape water points with appropriate vegetation cover to reduce evaporation and encourage biodiversity renewal. Togo's Ministry of Water Resources has gained a tool to help manage water policy under a changing climate, supported by more informed communities and local authorities that understand the importance of small dam rehabilitation and can see the impact of such interventions on people and their livelihoods.

Economy and Ecosystem-Based Adaptation

- In Mozambique, the project provided seasonal labor for the household members involved in the activities. Families that once were only depending on fishing activity at the sea are now involved in fish and crab farming and they are getting enough for consumption and

also selling the fish and crabs they harvest. The income from the sale of these products is used to purchase food and other goods for the households, ensuring food security and increasing resilience of local communities to climate change. Mangroves provide a nursery area for many marine species, most of which are important for food, like fish, crabs, and shrimp. Reforestation of mangroves has ensured the normal functioning of this ecosystem, which has in turn increased fishery productivity and yield, ensuring enhanced food security. The implementation of fish and crab farming has increased change resilience for the local community. Fishers who previously relied solely on fishing in the sea for their livelihood have crab farming as an opportunity to overcome the crisis of catches in the fishery activity. Crab farming is also having an effect in reducing the deforestation of mangroves at the local level. The outcomes of this

project have helped the college of Marine Science at Eduardo Mondlane University in Mozambique develop fish and shrimp farming in the same area.

- In Uganda,⁶ where the EbA actions initially took place, conventionally preparing an acre of land for planting costs no less than US\$100; however, with conservation agriculture (CA) introduced through the implemented ecosystems-based actions, only 25% of that cost is adequate to prepare the land. Beside the monetary savings, such techniques have saved time, allowing farmers to engage in other enterprises as well, such as livestock rearing in the country. In tandem, these efforts have helped reduce rural poverty in Uganda. Also besides growing more food, the sustainable approach has decreased the use of chemical fertilizer and pesticides, saving farmers money, reducing pollution, and allowing depleted soils to recover.

Implications for Regional Food Security Policy

- Reorienting local food systems toward modes of production that are highly productive with ability to improve the sustainability of agroecosystems by creating beneficial biological interactions and synergies among the different components is imperative.
- The case study from Mozambique showcases intensive crab production being used to supplement food productivity, especially protein needs of the population, and also to address poverty through alternative livelihoods. Following the extended coastline of Africa and the intensive population of coastal cities, capitalizing on seafood productivity provides an important source of food security in Sub-Saharan Africa and the potential for upscaling and expanding the program to cover the whole of Africa and other developing country regions.
- The EbA actions in Uganda have demonstrated good agronomic practices that are currently taken up by farmers; for example, soil and water conservation, use of inputs such as fertilizers, biological nitrogen fixation by leguminous cover crops, and so on, in addition to timely planting at a larger scale. This has resulted in increased productivity at field level, ensuring food availability. Revegetation and reforestation result in restoration of hydrological cycles and nutrient flows within the landscape and in the return of more diverse species communities.
- The EbA actions in Togo demonstrate that rehabilitation of small dams offers great opportunities in addressing water needs for African rural communities and provides local support for adaptation in sectors such as agriculture, livestock, health, and energy, helping boost the resilience of ecological systems.
- By extending support to build on the EbA approaches as illustrated by the projects in Mozambique, Uganda, and Togo, the occurrence of future food crises could be reduced and adaptation to climate change could be more manageable. Experience from the EbA intervention model of addressing climate change and enhancing food security shows that well-timed and targeted EbA interventions can have a significant impact on, for example, addressing food security and empowering societies to build their biophysical and social resilience to climate change and variability and also benefiting the environment.



A Mozambican fisherman pulling a fishing net from the water.



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Even in the United States, the worst drought in decades is affecting crops such as corn.

A Way Forward

Given the unfortunate, frequent occurrence of droughts, practical actions are ever more critical to ensure achieving food security in this region. Understanding what has previously worked can provide a guiding vision as we proactively address the current crisis. Food security and human security are inextricably linked, and innovative initiatives are needed to create opportunities to face continental challenges regarding future food security requirements. Sustainable food security strategies must thus, among others, develop new

opportunities, increase productivity in agriculture, and assist in the development of domestic markets that can withstand international economic volatility. Investment in EbA is one of the most important keys to job creation opportunities that simultaneously contribute to poverty eradication and to sustainable long-term food security. Such investments will improve the competitiveness of domestic production, increase farmers' profits, and make food more affordable for the poor. Creative strategies supported by dynamic leadership and management are the only way that Africa will be able to achieve the envis-

aged food-secure society in which its population does not experience fear of want. With proper planning, transparent resource management, innovative food security policies, and integrative agriculture inputs and outputs, it is not too late to turn the Africa's food crisis to the benefit of local communities.

Richard Munang holds a PhD in environmental change and policy from the University of Nottingham, United Kingdom. He is currently the UN Environment Programme Policy & Programme coordinator for the Climate Change Adaptation & Development programme. He specializes in societal and ecosystem-based adaptation and has conducted several assessments to understand how adaptation strategies and policy can be formulated to reduce climate change impacts. **Ibrahim Thiaw** has been the director of the Division of Environmental Policy Implementation (DEPI) in the United Nations Environment Programme since February 2007. He worked as IUCN regional director for West Africa and as the acting director-general of IUCN before joining UNEP. He has advised intergovernmental processes and collaborated with government agencies, civil society, and private-sector organizations. **Keith Alverson** is the head of the Climate Change Adaptation and Terrestrial Ecosystems Branch of the Division on Environmental Policy Implementation at UNEP. In this role he coordinates, inter alia, UNEP's Ecosystems Based Adaptation Climate Change program of work and the Global Climate Change Adaptation Network. **Mounkaila Goumandakoye** is the regional director for UNEP in Africa. Before joining UNEP, he worked for UNDP Drylands Development Centre, where he started first as a policy advisor and since 2007 was acting director. **Desta Mebratu** has more than 22 years of experience working for industries, government agencies, universities, and international organizations. He is the deputy regional director of UNEP Regional Office for Africa. **Jian Liu** is the director of UNEP International Ecosystem Management Partnership (IEMP). Prior to this appointment, he served as the chief of the UNEP Climate Change Adaptation Unit and as the deputy secretary of the Intergovernmental Panel on Climate Change (IPCC).

NOTES

1. UN, *World Population Prospects: The 2008 Revision* (New York, NY: United Nations Population Division, 2009).
2. Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels. EbA provides many other benefits to communities, including food security (from fisheries to agroforestry), sustainable water management, and livelihood diversification (through increasing resource-use options).
3. R. Munang, I. Thiaw, and M. Rivington, "Ecosystem Management: Tomorrow's Approach to Enhancing Food Security Under a Changing Climate," *Sustainability* 3(2011): 937-954.
4. R. Munang, and J. N. Nkem, "Using Small-Scale Adaptation Actions to Address the Food Crisis in the Horn of Africa: Going Beyond Food Aid and Cash Transfers," *Sustainability* 3(2011), 1510-1516.
5. <http://www.environmentmagazine.org/Archives/Back%20Issues/2011/March-April%202011/rural-water-saharan-africa-full.html>
6. Munang and Nkem, note 4 above.