



**3rd INTERNATIONAL CONFERENCE ON
COMMUNITY BASED ADAPTATION TO
CLIMATE
CHANGE**



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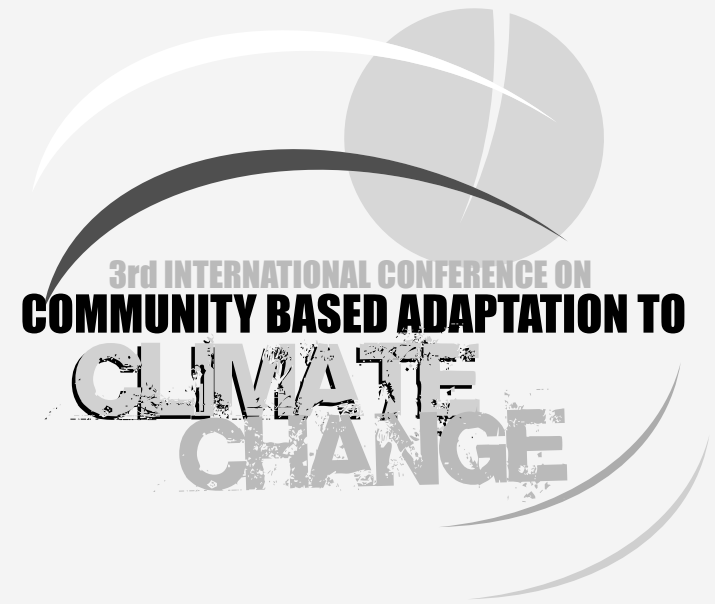
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[Abstract]

FEBRUARY 18-24, 2009 | DHAKA SHERATON HOTEL | BANGLADESH



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PREFACE

Over one hundred abstracts covering wide ranging issues and experiences in relation to community based adaptation to climate change were submitted to the technical committee of the Third International Conference on CBA to be held in Dhaka in February 2009. This demonstrates the great interest about approaches and practices of climate change adaptation among the researchers, practitioners, development actors and academics. Abstracts were sent from Asia, Africa, Latin America, Australia, Europe and North America. Considering the conference theme and diversity of issues, it was a difficult task for the technical committee to make the final selection of the abstracts for the conference. Sixty abstracts have been finally selected for making presentations in the conference considering the originality of topics, relevance to the conference theme, innovativeness in approaches and importance of there findings.

The abstracts have been grouped into seven categories for this booklet. These include: methods and tools for community based adaptation to climate change; adaptation practices in agriculture; disaster risk reduction and climate change adaptation; education and awareness for community adaptation; climate change adaptation in urban situation; communicating adaptation; institutional initiatives; and mainstreaming adaptation. The CBA Conference will be organized jointly by Bangladesh Centre for Advanced Studies (BCAS), International Institute for Environment and Development (IIED) and Regional and International Networking Group (RING) with supports from the Ministry of Environment and Forest (MoEF) of the Government of Bangladesh and a number of international development agencies, donors and development partners. We acknowledge the valued contribution of the authors, conference participants and the partners. We hope this publication would be a source of current knowledge on community adaptation to climate change and useful for the adaptation practitioners, policy makers and researchers.

THEME

METHODS & TOOLS

Linking Community-Based Adaptation to Broader Development Processes: the Vital Role of Action Learning and Participatory Methodologies

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South Africa

While vulnerable communities lack an adequate voice in the international adaptation discussions, there is no doubt that community-based adaptation (CBA) to climate change is growing all over the world. Many tools, manuals and methodologies have been developed globally to help scope, implement and assess practical grassroots interventions for adaptation to climate change. However, in general far more support is needed to increase scale and effectiveness of local actions, and build learning networks. This paper synthesises lessons from the grassroots level of South African case studies, and identifies three key areas for support to CBA and a proactive approach to integrating adaptation into local planning and development:

- Participatory methodologies to enable effective links between climate science and local knowledge and practices;
- Action learning approaches and the use of the sustainable livelihoods framework to promote learning-by-doing from a holistic base; and
- Participatory monitoring and evaluation involving local users, which feeds back into an action learning approach at different levels, is essential for the kind of rapid and proactive responses required.

Participatory Vulnerability Assessment (PVA) as a Tool for Analyzing Climate Change Effects and Identifying Adaptation Needs in the Coastal Regions of Noakhali, Bangladesh

Remeen Firoz and Ainun Nishat
IUCN Bangladesh and
Farida Shahnaz
Practical Action, Dhaka, Bangladesh

The Participatory Vulnerability Assessment exercise was carried out in 21 unions of the Sadar and Subarnachar upazilas of the Noakhali District of Bangladesh for development of a disaster vulnerability map of the study areas, keeping in mind the threat of increase in frequency and magnitude of natural disasters induced by climate change. This area located in coastal zone is extremely vulnerable to the impacts of climate change. The PVA is a useful tool for capturing and addressing the issues emerging from climate change and variability. The major stakeholders consulted during the process were farmers, fishermen, children, women, day laborers etc. A number of social research techniques were applied for understanding the current and future vulnerabilities and the coping strategies adopted by people. This was done through FGDs, vulnerability and resource mapping and basic statistical tools such as ranking and scoring. Findings of the PVA clearly indicate that water logging is the main problem, along with drainage congestion. In addition, cropping patterns are seriously affected by salinity in soil and long spells of inundation. During consultation process, the participants reported some unexpected behavior of weather as well as their perceptions about changes in the climatic trends.

Adaptation and Local Knowledge: Communities' Vulnerability to Climate Change and Endogenous Adaptation Strategies in Benin

Houkponou, K. S., Bokonon-Ganta e., Nouatin G. & Gngangassi C, IDID-ONG
Benin

In Benin, agriculture is seriously threatened by climate change and climate variability. Under the project for strengthening the adaptive capacities of rural Benin actors on Climate Change (PARBCC) implemented by the NGO Initiatives for Sustainable and Integrated Development (IDID), a participatory diagnostic was carried out in 35 municipalities across 6 Departments of Benin (Plateau, Atlantic, Couffo, Collines, Donga and Aliborio). This helps to identify major climatic risks which people face in terms of climate change and climate variability and adaptation strategies developed in response to each risk category, according to agro ecological zone.

The results show ten major risks; of which the most important are: the rain delay, the spatial and temporal variability of rainfall, excessive rainfall, pockets of drought in the rainy season and strong winds early and end of season. In response to these risks, adaptation measures developed by producers cover three area: the options for integrated management of soil fertility, options of Integrated Management of Water Resources and updating of planting dates. One of these options in southern Benin is planting at different dates in the same field to have crop at different growing step to minimize harvest lost if climate risk occurs.

Anticipatory Learning under Uncertainty: Building Capacity for Climate Change Adaptation

Petra Tschakert and Katie Dietrich
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The current adaptation discourse focuses largely on responding to predicted impacts of climatic change for some time in the future rather than addressing the determinants of vulnerability and adaptation action. Thus far, scientists have failed to engage in integrative research on tools that facilitate learning and decision-making under complex risks and uncertainties, including those related to climate change. Our existing methodological toolbox is sparsely equipped to initiate and sustain such adaptive and forward-looking learning. We use the concept of anticipatory learning to examine people's capacity to adapt to climatic changes. Based on complex systems theory and participatory action research, we explore how communities in Africa not only respond to the impacts of climatic changes, but how they can develop the capacity to make flexible decisions and trade-offs in the face of uncertainty. We consider scenario building and popular theatre as highly appropriate tools for discussing and communicating future climatic uncertainties, outcomes, and adaptive strategies. Scenario building encourages social learning about uncertainties by creating stories of plausible futures. Popular theatre provides an innovative and culturally sensitive means for raising awareness and building agency. The ultimate goal is to design tools that improve communities' adaptive capacity by encouraging interactive and anticipatory learning.

Community-Based Adaptation to Climate Change: Perspectives from Rural Vanuatu

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What is the nature of vulnerability and resilience to climate change at the community scale in Pacific island countries? What approaches to climate change adaptation are most appropriate at this scale? These questions are examined in the context of rural Vanuatu, a Melanesian least developed country particularly susceptible to changes in climate variability and extremes. Fieldwork on the islands of Santo, Efate and Mota Lava interpreted vulnerability by beginning with local perceptions and experiences of dealing with climate risks. Vulnerability to climate arises from a context of rapid social change. Predominantly 'non-climate' factors such as population growth, land issues, changing traditional governance and eroding traditional knowledge are linked to changing agricultural practices, natural resource degradation, and increasing reliance on imports. These factors and processes affect the ways and degree to which communities are able to cope with climate stresses such as tropical cyclones, drought and heavy rain. However, research findings challenge the common notion that Pacific Island communities are inherently vulnerable; each community engages endogenous mechanisms of resilience. Aspects of this resilience may be threatened however especially where resilience depends on flexibility and self sufficiency, and particularly given increasing climatic uncertainty in the future. In this context therefore, 'adaptation to climate change' requires communities to adapt to both changing climatic and social situations.

A Guide to the Vulnerability Reduction Assessment

Andrew Crane Droesch, Nickey Gaseb, Pradeep Kurukulasuriya, Andre Mershon, Katiella Mai Moussa, Dale Rankine, Alejandro Santos
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The Vulnerability Reduction Assessment (VRA) is a form of participatory impact assessment used in UNDP Community-Based Adaptation programming. The VRA is based theoretically on the UNDP Adaptation Policy Framework, and informed by project-level M&E frameworks used in biodiversity conservation of community development projects. Taking a semi-structured and context-informed approach, the VRA is designed not only to measure the success of an individual project, but to aggregate and compare project impacts across a diverse portfolio of project contexts, demonstrating programme-wide impact. An overview and guide to implementation of the methodology is presented, as well as a set of initial lessons from implementation and to be shared.

Community Adaptation in Bangladesh - Designing Research for Action and Outreach

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Bangladesh is widely regarded as one of the countries that is most at risk from climate change. It will not only increase the intensity and frequency of these hazards but also fundamentally change the conditions for agriculture, forests water and fisheries on which around 80% of the population depend for their livelihoods.

Many of the people in Bangladesh are poor, or likely to be pushed into poverty by the next disaster or even relatively small changes to their production resources, are in the frontline for finding ways to adapt. The adaptation process has to be on two fronts at the same time: to deal with increased risks from hazards that might bring disasters, and to deal with the more everyday changes in patterns of rainfall, temperature, diseases of crops, livestock and humans that affect livelihoods.

Action Research for Community Adaptation in Bangladesh is a new project designed to work with the people to find out what they are already doing to adapt, and to engage in participatory action research that will discover and share new ways to adapt. It will bring together farming, fishing and forest peoples with local and international NGOs, university and research agencies, local and central government and international donors who will be organised in a network for sharing knowledge and experience, capacity building, learning and replicating - within Bangladesh and across the world.

Project will work with around 15-20 communities in locations that have particular production conditions and existing livelihoods suited to those conditions. It will examine the impacts of climate change on the way that the rural economy interacts with urban centres. So far there is very little research on what the impact of climate change will be on rural-urban interactions. What conditions might be best suited to rural livelihoods that reduce the need for people to migrate? Further, it will adopt a federal type of structure, in which different types of partners and actors are linked together in ways that share experience, build capacity and transfer knowledge - within Bangladesh but also to other countries.

Local Options for Communities to Adapt and Technologies to Enhance Capacity (locate)

Mozaharul Alam

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International Fellow, International Institute for Environment and Development (IIED), UK

Saleemul Huq, Director, Climate Change Programme, IIED, UK

Atiq Rahman, Executive Director, Bangladesh Centre for Advanced Studies (BCAS)

Adaptation to adverse impacts of climate change is unavoidable even a significant reduction of greenhouse gas reduction in future. Vulnerability of different communities dependent on natural resource bases will be more unless adequate measures and actions are taken place. There are methodologies and tools for assessing vulnerability and adaptation and are reasonably robust at global and regional scale but has scope to improve in designing adaptation at national level, local level and community level. At the community level the predominant approaches and methods to define measures and actions are hazard based and starting point of integration of adaptation to climate change is in the existing measures and activities.

This paper describes a framework called Local Options for Communities to Adapt and Technologies to Enhance capacity (LOCATE) with applicable methods and tools for designing and implementing community based adaptation project activities. This framework has been developed and applied by Adaptation Teams as part of the SouthSouthNorth (SSN) - Adaptation to Climate Change Programme. The framework has been developed and currently being applied to assist local organizations working in partnership with various stakeholders at local levels to identify, design, develop, and implement Community Based Adaptation (CBA) to climate change project activities. This framework is currently being applied in six countries and has been previously referred to as the SouthSouthNorth Adaptation Project Protocol (SSNAPP) methodology (Alam and Mqadi, 2006).

Community Based Adaptation - A Conceptual Framework

Rachel Berger
Practical Action, UK

The presentation will frame community based adaptation in the context of the uncertainties surrounding future climate change. The key issues of reducing vulnerability to climate change, increasing resilience and building adaptive capacities will be explored, and the overlaps and differences between adaptation to climate change, sustainable development, and disaster risk reduction will be discussed.

The framework will be illustrated with examples from Practical Action's work with communities.

A project-based approach will never meet the need for community based adaptation. Some alternative ways of scaling up, and the challenges each poses, will be highlighted, with reference to countries where Practical Action is working.

Climate Vulnerability and Capacity Analysis

Mr. Amílcar Lucas
CARE Mozambique

This presentation deepens our understanding on The Climate Vulnerability and Capacity Analysis methodology as developed by CARE to assist us in analyzing the implications of climate change for the lives and livelihoods of the people we serve. By linking local knowledge to climate science, the process serves to build knowledge of local stakeholders on climate change risks and adaptation strategies. It provides a framework for dialogue on climate change issues within communities and between communities and other stakeholders. The analysis establishes a solid foundation for the identification of practical strategies to facilitate community-based adaptation to climate change. The methodology suggests collaborative and facilitated processes for doing this, so that the analysis of climate change vulnerability also meets the objectives of multi-stakeholder learning and building processes of shared understanding and concerted action among those affected by climate change. The CVCA approach is designed to fit within a broader participatory planning process, bringing climate vulnerability issues into the dialogue. The process of gathering, analyzing and validating data on climate vulnerability and adaptive capacity promotes dialogue on these issues within communities, and between communities and other stakeholders.

The CVCA methodology may be used and adapted to gather and analyze information to design climate change adaptation initiatives, as well as to integrate climate change adaptation issues into livelihoods and natural resource management programs.

The presentation highlights a number of characteristics which make the CVCA process different from other forms of participatory analyses for action. The CVCA methodology can be used by **Project managers and field staff**, by **Local partners (government and NGOs)** and by **Communities**.

THEME

ADAPTATION IN AGRICULTURE

Climate Change Adaptation Experiences of Smallholder Farmers

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Agriculture in the developing world is particularly vulnerable to climate change. Intergovernmental Panel on Climate Change (IPCC) highlights that in some countries in Africa, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020, and in Central and South Asia, crop yields could fall by up to 30 per cent by 2050 as a result of climate change. This decrease in food production and food availability represents a fundamental threat to the capacity of affected communities to exercise their right to food. Seventy per cent of the world's extreme poverty is found in agricultural areas where smallholder farmers depend on rain for their harvests.

ActionAid's field work in five countries confirms that climate-induced declines in crop production are already happening today. Farmers have begun to adapt by adopting sustainable, low-input agriculture techniques such as in Bangladesh, some farmers are increasing their cultivation resilience by changing the patterns and by raising the beds of their vegetable plots. In Ghana, farmers are combining local and traditional practices of mixed cropping to reduce the crop loss to natural hazards.

However, communities lack resources and support to upscale their efforts to avert the crisis. Policy-makers at national level must enhance public spending on agriculture, improve infrastructure, and enhance access to agricultural extension services and incorporate adaptation strategies into all national policies and programmes related to food and agriculture to increase the resilience of small-holder farmers. The post-2012 global climate treaty must provide substantial new and additional resources for climate change adaptation and promote sustainable agricultural practices, ensuring effective participation of poor and excluded communities, especially women.

Adaptation of Fishing Communities in the Philippines to Climate Change

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More than half a million small fishers in the Philippines have been availing of loans from Quedancor, the credit arm of the Department of Agriculture. The financing scheme has been quite successful with repayment rate at 95%. However, climate change has brought about more frequent typhoons as well as pests and diseases which have affected the productivity of fisheries, thus, hindering fishers from paying and renewing their loans. Failure of access to credit could disable them to continue venturing on fishing activities and could eventually jeopardize the welfare of their entire household. The inability of creditors to pay their loans and meet their obligations also impair, to a large extent, the financial operation and viability of the lending institutions. This study analyzes the adaptation practices of these fishers. It recommends mechanisms to minimize the impact of climate change. Moreover, it suggests a bridge financing scheme that can be an effective and efficient instrument to enable fishers to carry on their livelihood activities and support their families' basic needs and slowly recover from their losses.

Integrated Farming: a Climate Change Adaptation Strategy for Small and Marginal Farmers in Low Lands of Sundarbans

Anshuman Das,
Development Research Communication, Kolkata, India

The Sundarbans, the largest coastal wetland and mangrove forest is shared between Bangladesh and India. It experiences a subtropical monsoonal climate with an annual rainfall of 1,600-1,800 mm and severe cyclonic storms. Large areas of the Sundarban mangroves have been converted into paddy fields in the past century. The regulation of river flows by a series of dams, barrages and embankments for diverting water flow for various human needs and flood control has caused large reduction in freshwater inflow. The recent changes in climatic condition and environmental degradation, enormous amounts of sediments carried by the rivers contribute to riverbed filling which in turn brings problems like river bank erosion, flash flood, increase in salinity in soil and water, changing of cropping pattern, water logging in rainy season, draught like condition in pick summer and changes in sedimentation. More threats are expected from global climate change, especially from sea level rise. The major livelihood in this region, farming, especially for small farmers, became unpredictable, vulnerable and marginalized.

This paper tries to analyze adaptation strategies by small and marginal farmers having 0.1 acre of land in average (which were almost uncultivable due to water logging) by re-shaping of their farming land to make the land cultivable and to accommodate multiple subsystem (pond - rice field - vegetable garden), diversifying farming system with introduction of multiple components (fish-duck-azolla-rice-vegetable) with multistory arrangement hence diversifying the source of income and reducing dependency on a single crop, rainwater harvesting as a source of fresh water and proper crop selection.

Crop Insurance as an Instrument of Adaptation to Climate risks: The LDC Context

Dr. Mizan R. Khan
Professor & Chair and
Dr. Sirajul Islam
Assistant Professor, DESM, North South University, Dhaka

With a focus on relief and recovery, the existing *ex-post* disaster management fails to provide incentives for disaster risk reduction. So, articles 4.8 of the UNFCCC and 3.14 of the Kyoto Protocol have included the provision of insurance as an adaptation instrument to address climate risks. Bangladesh and Ethiopian NAPAs have included it as priority projects. Crop insurance exists in some countries, but with government subsidy. Countries like India, Malawi and Ethiopia have started index-based crop insurance targeted at small-scale farmers, in partnership with some development agencies. In Bangladesh, the existing micro loan or life insurance products of some MFIs do not cover property or crop losses from weather-related disasters. Crop insurance, initiated in the late 1970s, did not succeed because of moral hazards and institutional weaknesses. A study done by the Department of Environmental Science and Management (DESM) at NSU shows that total costs of relief and recovery related to climate-related disaster like floods do not exceed the likely indemnities to farmers, based on subsidized premiums. What is needed for the purpose is a partnership among global development agencies, disaster management and climate change communities for implementation of the convention provision of insurance in the form of index-based crop insurance in the LDCs.

Facilitating Adaptation to Climate Change and Variability Through Sector-Specific Interventions in Sadar and Subarnachar Upazilla of Noakhali District

Ainun Nishat, Raquibul Amin, Remeen Firoz, Eshrat Sharmen, IUCN B
Farida Shahnaz, Practical Action, Dhaka
Rakibul Haque, Climate Change Cell/Department of Environment, and
Arif M. Faisal, ADB

A project entitled 'Promotion of Adaptation to Climate Change and Climate Variability in Bangladesh' was implemented by IUCN Bangladesh, in Sadar and Subarnachar upazila of Noakhali District with the assistance of the Netherlands Climate Assistance Program (NCAP). A number of noteworthy initiatives have been undertaken by the project at various levels, both for influencing policy and enabling institutions as well as to promote adaptation practices of the vulnerable coastal communities. The project paid attention to existing policy regime that influenced disaster response at local level and the institutional framework including involvement of Local Government Institutions in climate change adaptation. One component of the project focused on resilience of local communities as well as traditional knowledge in facing climatic extremes. The project has generated information and demonstrated climate resilient housing, fishing boats and agriculture at the local level. The new demonstration houses with improved structural interventions and minor modifications to house building materials have been erected at a number of pilot sites. Improvements of basic design and use of standard material have also been recommended for strengthening the structure of boats. Capacities of local carpenters, masons and boat builders have been developed through training on the improved designs. Field testing of saline tolerant rice variety has also been introduced in a number of demonstration plots. Research on the above mentioned interventions will influence the local people to better adapt to climate change and are expected to reduce poverty and vulnerability.

Climate Change Vulnerability and Risks in Local Communities of Nepal: Farmers Innovations and Local Solutions

Bimal R. Regmi
Lalita Thapa
Rojee Suwal, and
Sandhya Karki, LI-BIRD, Nepal

Climate change has become a global political and policy discourse. Climate risks and hazards seem to be increasing with adverse impacts to the livelihoods of local communities. This presentation aims to contribute to the increased understanding of how to integrate climate change adaptation in research and development projects and programs aimed at poverty reduction in ways that increase the capacity of individuals, households and communities to respond to climate variability and change. This presentation will address poverty reduction and climate adaptation-lessons learned and future challenges with focus on strategies implemented by Local Initiatives for Biodiversity, Research and Development (LI-BIRD) with the support from donor communities. Case studies on local level farmers' innovations like on-farm management of plant genetic resources, home garden promotion, management of neglected and underutilized species, participatory plant breeding, participatory innovation development and innovative funding mechanism, and livelihood diversification will be the focus in the presentation. The case studies represent illustrative examples of what risk reduction, vulnerability reduction, and enhancement of adaptive capacity to climate change can look like in different contexts, as well as how research and development interventions targeted at poverty reduction measures can influence these facets and thus enhance resilience. There is a clear message that it is necessary to base adaptation activities on sufficient understanding of local livelihood strategies and contexts, poor people's problems, efforts, values and aims and how these relate to local climate variability and change by involving and empowering communities.

Adaptation of Two Contrasting Rural Communities to Climate Change in Morocco

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The poorest communities in Morocco live in arid and semi-arid rural areas, and are largely dependent on agriculture for their livelihood. Increased climate variability is expected to exacerbate poverty in these vulnerable communities. This study aims to enhance the adaptive capacity of rural communities. Building on assessments of climate change impacts on agricultural systems, natural resources and local residents, research team analyzes risk behaviour to identify and formulate appropriate options for adaptation to climate change.

Preliminary results showed that average rainfall has significantly decreased in the two communities, with a tendency of temperature increase. Impacts of these changes had on natural resources and production systems of the communities include: decrease of water availabilities and grain productivity, degradation of vegetative cover in the rangeland, disappearance of some crops. Adaptations measures taken by the communities include: introduction of new high return crops, adoption of water saving techniques, reduction of flocks size, development of ecotourism related jobs. But, it was revealed that there is a serious lack of information about more other appropriate technologies and government financial aids and subsidies. A participatory training program was developed and initiated to overcome these deficiencies. Other ongoing investigations are tackling decision-making processes, livelihood status and gender aspects as affected by climate changes.

Community Initiative to save Livelihood through Adaptation to Climate Change

Arun Jindal,
Executive Director, Society for Sustainable Development,
Karauli, Rajasthan, INDIA

Climate change is rapidly emerging as one of the most serious threats that humanity may ever face. According to Bob Watson, the World Bank's chief scientist and advisor for environmentally and socially sustainable development, "The Earth's climate is already changing, and further change is inevitable. Therefore we need to both mitigate climate change and to adapt to climate change. Many countries, especially in Africa, Asia and Latin America, the challenge of the day is adaptation to current climate variability and climate change."

India is particularly vulnerable to climate change because of its high proportion of low-input, rain fed agriculture. This type of exposure to rainfall variability also extends to livestock, which mostly depend on range and grasslands that are affected by environmental shocks, such as climate change. In addition, temperatures in India are already generally high and rainfall patterns often erratic and climate change that exacerbates these conditions will thus create even more hardship. Poverty is widespread in India, and governments typically face tight budget constraints, making it much harder for individuals and governments to invest in adaptations to climate change. Moreover, India is also facing problem of land degradation, so farmers are already struggling to grow crops on land that contains inadequate nutrients and has little capacity to retain water. Farmers in countries like India will clearly need to adapt to a climate that is changing and will change further. Farming practices will have to change in many regions. In the face of drier, hotter weather, farmers may need to switch the crops they grow. For example, farmers in some areas of India may switch from Wheat to Mustard, which requires less water. Or they may switch to more drought resistant or heat-resistant varieties of the crops they already grow. At the farm level, farmers need to perceive a need to change. The western part of India is part of arid and semi arid zone and regularly affected by drought. In Rajasthan "Dang" area is ecologically rich but community lives there in poor condition. Society for Sustainable Development (SSD) implemented projects, which not only improve livelihood condition of the community, but also help community to adapt climate change.

In the area, rain in the month of September-October support farmers to grow Rabi crop in the field with stored water in "Pokhers". Framers adapted pokhers are happy to share the information about how they are able to get Rabi crop without assured irrigation. They also inform that if they don't have "Pokhers" in their field, they were unable to survive their families in changing environment. Community shows that if traditional technologies with new dimensions adapted, than future generations not only save their lives but they can also save natural resources.

Improving Livelihoods Amid Consequences of Multiple Hazards

Dinanath Bhandari
Program Officer, Practical Action, Nepal

Impacts of climate change are interlinked or embedded in different hazards as contributing factors and spread over larger areas; their causes often not known to the vulnerable communities. A study was carried out in three villages adjacent to national park and rivers banks in Chitwan district, Nepal in 2008 involving large cross-section of the community to assess their vulnerabilities, livelihood strategies, available resources and indigenous knowledge, coping mechanisms and existing strategies on disaster management. Information from different sources on different hazards, their causes and impacts on the livelihood of families were triangulated in analyses.

Different hazards impact at different times of the year. Flash floods occur during the monsoon between June and October, dry spells usually occur between November and May. Lately the rainfall pattern has been changing creating water shortage for growing crops even during monsoon period. Winter fog covers in the mornings during December and January and in recent years it is more frequent, dense and lasts for longer (whole day) and expands up to second week of February. New disease and pests attack crops of different seasons, but lately winter crops are more prone to viruses. Usually wildlife intruded year round but between November and May, when food is scarce in the Park, growing crops are more prone to invasion.

Invasive weeds have affected communities in three ways. Firstly, they have invaded grasslands, under storey and ground cover in the park and community forests decreasing availability of fodder for both wildlife and livestock. Secondly, weeds have increased cost of crop production otherwise decrease yields. Thirdly, the shortage of food in the park and community forests has increased wildlife intrusion in the villages. Wildlife damages crops, homes and cattle sheds, attacks livestock, sometimes claiming human life.

While different hazards have specific effects, the ultimate impact of each hazard on livelihood outcomes is similar: each reduces livelihood assets, the access to the remaining assets, peoples' capacities and their rights. Indigenous knowledge and coping mechanisms have not been sufficient to deal with the compounded impacts of multiple hazards.

In future vulnerability to these hazards is predicted to be exacerbated by increasing human population, unsustainable agricultural practices in catchments of rivers, changing vegetation

composition (inside the park), limited options for livelihoods, slow development processes and the adverse impacts of climate change.

Community and stakeholders have initiated strategies to minimize the risks of disasters through integrated approaches of managing local resources and increasing resilience capacity of families. These strategies include defending wildlife by erecting electric wire fence around villages, building shallow tube wells and water collection wetlands, awareness and skills and services on agriculture and livestock, embankments along the rivers, flood warning mechanisms, provision of disaster management committee and emergency fund within local governments.

While local communities, with external supports, would be able to minimize risks of some hazards and improve existing resilience capacity, many initiatives would need additional efforts in larger geographical areas beyond the villages such as improving watersheds of rivers, managing habitat inside park and policy reforms at national level in the context of multiple vulnerabilities.

FADAMA Project and Potentials for Integrating Climate Change Adaption into its Implementation

E. C. Nzegbule

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The ecological settings (arid, savannah, rainforest, and coastal) in Nigeria present a diverse climate change impacts and possible approaches for adaptation. As climate change impact increases in severity and adaptation actions are being initiated to improve resilience and adaptive capacity in communities, it is imperative to appraise rural-targeted projects and possibility of integrating adaptation measures.

The National Fadama 11 Development Critical Ecosystem Management Project (CEMP) funded by World Bank and African Development Bank covers six states in Nigeria including that in Oguta, Imo State. With presence in almost all the major agro-ecological zones Fadama 11 CEMP aims to enhance the productivity and the livelihood systems in the project areas supported through sustainable land-use and water management. Fadama 11 CEMP and Community-based adaptation initiatives in Nigeria have areas of interface in terms of intended outcomes and target beneficiaries.

Oguta lake watershed where a Fadama 11 CEMP project is sited has a total area of 410 km², drained by 4 rivers with upland (35%) and lowland (42 %) ecological settings as well as a forest reserve (13 %). Assessment of the areas vulnerability show that it is risk-prone to climate-induced disasters because of significant area of floodplain, high dependence to natural resources affected by climate variability, subsistence rain-fed agriculture, inadequate infrastructure, high poverty level, low level of climate change awareness and cultural gender discrimination. Incorporating adaptation approach to the Fadama project in Oguta is feasible considering that it is an on-going initiative in the area and coping strategies (although inadequate to deal with future impact) are already being practised by the local communities. Such approach as being planned must recognize the achievements of the fadama and integrate the indigenous adaptation strategies.

Community Led Actions against Food Insecurity in Maradi Dstrict, Niger

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Environment Development Third World,
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In December 2006 and January 2007, ENDA conducted some action research activities in Maradi district (southern Niger). The overall objective of this action research was an assessment of people's (local communities including farmers, herdsman, small traders, local decision makers, etc.) adaptive capacity to climate variability and changes. The aim of this research was also to identify adaptation strategies already implemented by those communities, particularly regarding water resource management to cope with adverse effect of climate change. Following that survey, all potential adaptation strategies were documented through a process which involved local community stakeholders and researchers.

Because of climate variability and change, the farmers are facing a tremendous challenge in fetching surface and ground water for irrigation. As a result, any adaptation strategy via irrigation became so costly that it is out of many small farmers' reach. In order to ensure their food security, these communities generally use available social networks, solidarity mechanisms and other livelihoods which are unfortunately also affected by climate change.

→ The overall objective of this pilot action initiative will be the reduction of food insecurity through a better access and management of surface and underground water resources in the three cluster villages of Tibiri, Maradawa and Gabi in Maradi district. The project intends to conduct participating analysis, build partnership with vulnerable communities, implement action and promote knowledge sharing.

The expected outcomes are: to achieve food security in case of bad harvests, are well known, databases (climatic, ecological and socio economic data) are developed for involved villages to foster current and future adaptation, concrete adaptation actions in water resource management are identified in partnership with the communities, and a participatory strategy (time line, responsibilities and means) for future implementation of identified adaptation actions is set.

Early Experience of Climate Change Adaptation in Flood Prone Areas of Bangladesh

Barkat Ullah, Co-ordinator, Climate Change and DRR Project,
Farida Shahnaz, Programme Manager, Practical Action - Bangladesh and
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In the advent of climate change in Bangladesh, intensity and frequency of natural hazards such as extreme fluctuations in temperature and rainfall, flooding, river erosion, agricultural drought, and cyclonic storm surge will be exacerbated. In floodplains, high intensity floods will become a frequent phenomenon. It is anticipated that the current level of coping would largely fall short in a bid to maintain livelihoods of poor people in the floodplains.

Practical Action - Bangladesh implemented an adaptation project during 2004 to 2007 in north-western flood susceptible region of Bangladesh for increasing resilience of poor communities. The project interventions helped increase adaptive capacity of over 2000 households in Gaibandha District in collaboration with two local partner NGOs. The project promoted a number of adaptation options which include the following:

- Cultivation of vegetables on floating beds, the latter giving access to productive system when lands are all inundated
- Rearing and production of fish in cages placed in open water bodies, thereby avoiding loss through release of fish in water
- Construction of flood tolerant housing units
- Elevation of tube wells to avoid submergence and subsequent contamination by flood waters
- Co-production of fish and ducks in inundated ponds
- Promotion of portable improved cooking stoves for food preparation during flood
- Promotion of alternative livelihoods for flood victims and
- Establishment of tree nurseries for planting flood tolerant tree species.

In addition, the project helped raise awareness on climate change, influence the formulation of disaster risk reduction plans in a participatory manner, demonstrated pilot scale interventions for local uptake and influenced policy. A number of adaptation modalities are successfully replicated by local people in the neighborhood.

Enhancement of Adaptive Capacity of Drought Vulnerable Community in North-West Region of Bangladesh

Sarder Shafiqul Alam, Research Fellow
Aminur Rahman, Senior Research Officer, BCAS

Bangladesh is one of the most vulnerable countries among the least developed countries in the world considering its location and dependency on natural resources. Climate change impacts and vulnerability will be increased in frequency and severity in future. The people of low income group will not be able to cope with risks and their lives and livelihood would be affected severely. So, they need adaptation strategy and options to survive in climate induced present and future condition. North-Western part of Bangladesh is drought prone area. Severity of drought increases during November to May each and every year. The recent studies in climate change predict that drought situation will be aggravated in the region in coming years.

A countable number of focused group discussions have been conducted by the SSN Bangladesh team members with different stakeholders to assess present vulnerability and impact of climate change and what adaptive measures should be taken to cope with the present and future vulnerability. In this regard, household survey have also been conducted at Dharmapur, Zinarpur and Krishnapur villages under Parbotipur union and Gomostapur upazilla of Chapai Nowangonj District to assess the level of impacts and vulnerability.

Considering present drought situation a community based adaptation project is being implemented by Caritas-Bangladesh with the technical assistance of BCAS with the goal to enhance adaptive capacity of the poor and vulnerable community in the drought affected areas to address the adverse impacts of drought, low rainfall and depletion of water resources as consequences of climate change.

A number of adaptation measures have been undertaken as project activities to increase availability of drinking and domestic water, increase access to and effective use of water for irrigation, demonstration of drought tolerant crop varieties. Agriculture and livelihood related information centre was established to raise awareness on climate change vulnerability and impacts as well as on response measures.

Increase access to and effective use of water for irrigation is an AdMit (Adaptation and mitigation) activity. Here we use a photo voltaic pump to lift water from pond to tank by using solar power. Then water is used to irrigate crops field through plastic pipe to protect drainage loss and evaporation loss. The project also promote crop as well as livelihood diversification to build local capacity and resilience to climate and natural shocks.

Field Evaluation of Zero Tillage in Maize, Priming in Chickpea and Mulching in Potato Cultivation in Drought Prone Areas of Bangladesh

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High Barind Tract covers an area of about 1,600 sq km under north-west region of Rajshahi. Soils of Barind tract areas are swelling and sticky clayey, acidic having very low organic matter content. Soils are poorly drained with low water holding capacity. Average rainfall between June-September is about 200 mm. Soil cracking, moisture stress and nutrient deficiency are major soil-related constraints. Most soils are kept fallow during winter season after harvest of T.Aman rice due to moisture stress. Four field trials were conducted on maize under zero tillage by dibbling method in muddy soils just after recession of flood water at Godagari of Rajshahi district and at Shapahar of Naogaon district in late November, 2007 to evaluate the suitability and performance of multipurpose maize cultivation under zero tillage using residual moisture. Field trials were also conducted on chickpea using priming technique and on potato using water hyacinth mulch at Godagari and Shapahar locations during winter season, late November, 2007 to evaluate the performance of priming and mulching at moisture stress condition.

Results of farmers' field trials showed that a comparable grain yield of 5.5-7.1 t/ha hybrid maize was obtained at farmers' condition under zero tillage. Farmers were found very much interested to cultivate maize under zero tillage with less production cost at appropriate sowing time. Furthermore, because of deep rooting system, maize crop can withstand drought and moisture stress. The crop can generate food to meet immediate hunger, green fodder, dried straw and poultry feed. The canopy in the full grown stage produce shade on the ground that reduces evaporation loss. Field trial results of chickpea showed that chickpea yield of Barind areas can be significantly increased by 18%-28% by adopting simple technique of priming over non-priming due to proper germination and establishment of healthy uniform plant stand. Results of field trials on mulching in potato cultivation showed that significantly higher tuber yields were obtained due to mulching compared to non-mulching yield with best utilization and conservation of residual soil moisture in drought prone areas of High Barind Tract. Here fertilizers, soil moisture and pesticides were found efficiently utilized in the cultivation of maize, chickpea and potato for obtaining desired yield under zero tillage, priming and mulching practices respectively. The action research shows that the innovative farming practices reduce the risk of drought, improves quality of resource base and improves production function. These production systems under moisture stress condition in Barind areas can generate food, employment and cash for vulnerable farming community.

Vulnerability and Adaptation of Communities to Climate Change: Changes in Agro- biodiversity in Low Ouémé Valley (Benin)

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In Adjohoun district, people's livelihoods depend on careful management of agro-biodiversity. For many generations people have fished, harvested wild produce from forests and mangroves, kept pigs, and grown crops of maize, cassava, beans, peanuts, leafy vegetables, palm and coconuts.

This study aimed to capture information on people's perceptions of local changes in climate and natural resources, examples of local adaptation (or failure to adapt), and what part local institutions play in strengthening people's resilience.

People have observed significant changes in their local climate – in particular, more variability in the intensity and seasonality of rainfall. Data from local meteorological office partially support these observations, but are not yet pronounced enough to demonstrate statistically significant trends. Growing seasons were found to be less predictable and available surface water less abundant. These changes are partly due to changing in local climates, but growing human populations and large-scale land use change, such as growth of industrial plantations, are also major drivers.

People's adaptations to environmental change combine technical fixes, such as faster-maturing crop species and varieties, with institutional support, via social networks and more formal organizations. Fishers reported using finer-meshed nets in the drier rivers, while acknowledging that the practice exacerbates local fish shortages. People have also started to plant fast-growing crops in the dried-out areas of swamp forest to ensure they gain a harvest within the shorter reliable growing season. Many have switched from building with local "afitin" logs to using concrete pylons as a way of cutting down on wood use while simultaneously building flood resistance.

To boost people's environmental capacity and resilience, local organizations have drawn on cultural traditions. They have adopted the local practice of using songs, proverbs and riddles to share knowledge about sustainable management of agro-biodiversity in the face of today's threats. Relevant institutions include shared management practices and community-based organizations.

Climate Change Adaptation and Mitigation through Community Based Agroforestry in Low Laying Developing Countries

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Most of the communities across the low laying developing countries depend upon agriculture for their livelihoods. But at the present time, alarm bells are ringing in relation to the impact of climate change on agriculture. Climate change is already affecting this sector by continuous flood and yield of most crops as temperature increases and this situation will be worst in near future. The communities of these countries have no options but to adapt themselves with this fateful changes through their own knowledge. Recently most of them are engaging in community based agroforestry (CBA) system. The present study looks into the adaptation and mitigation functions of this innovative practices. Results reveal that CBA system reduces the risk and increase the benefits of smallholder farmers. Four land use and management systems namely CBA, forest management, grazing land management and cropland management have been analyzed in this paper. It is felt that CBA is the potential one of all land uses to climate change adaptation and mitigation. So government and international organizations should support the small holder farmers in terms of money and research on how to enhance the adaptive capacity and mitigation potential of CBA system to cope with the additional stress created by climate change and increasing climate variability.

Reducing Vulnerability to Climate Change: lessons from the First Ever Adaptation Project in Bangladesh

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The RVCC Project (2002-2005) was the first initiative of its kind in Bangladesh to address the issue of adaptation to climate change and variability at the local scale. It was a three-year project, implemented by CARE Bangladesh in partnership with 16 local organizations and communities with funding from the Canadian International Development Agency (CIDA). The aim of the project was to:

- Reduce the adverse effects of climate induced phenomena on livelihood-related and/or household/community well-being related contexts of vulnerability;
- Enhance capacity of individuals/households and communities, and strengthen institutions and policies, to successfully respond to changes induced by climate stimuli; and
- Motivate people to make best use of opportunities provided by changes in hydro-geophysical system in six south west districts (Jessore, Narail, Gopalganj, Satkhira, Khulna and Bagerhat) of Bangladesh.

RVCC developed a novel method for analyzing local contexts of vulnerability and developed strategic modalities to foster adaptation. Community-level participatory vulnerability assessments (PVA) were conducted within the project area involving 78 focus group discussions conducted in 57 communities. The RVCC Project focused on five well-being indicators that accounted for more than 70% of the responses: income, food, water, health and personal safety, and housing and safety of property. A total of 48 elements of vulnerability were identified, including events that people feel vulnerable to (hydro-geophysical contexts of vulnerability) and why people feel vulnerable (socio-economic, cultural and political contexts of vulnerability).

Six different adaptive strategies were undertaken namely; (a) addressing food security, (b) addressing income security, (c) tackling health insecurity, (d) providing safe water, (e) addressing housing insecurity, and (f) directly reducing vulnerability by addressing the hydro-geophysical context itself. Separate awareness campaigns and advocacy campaign in communities, schools, union parishads, and media were also undertaken.

THREE YEARS AFTER THE RVCC

Three years after the completion of the RVCC project, in August 2008 CARE Bangladesh and their consultant, Centre for Global Change, visited the project area. The objective of these visits was to identify and document the extent and effectiveness of the adaptation measures which were introduced during the RVCC project to help households build more resilient livelihoods and reduce their vulnerabilities to climate change.

It was found that, even without project support, a good number of adaptation modalities under the “strategy for increasing food availability and its production” have been adopted by the households and have even extended these to their neighbors. There have been slow but gradual secondary and tertiary replications of a number of adaptation modalities at household levels. The most prominent ones include vegetables grown on hydroponics (*Baira*) or floating gardens as they are commonly referred to, the hanging vegetable production in water logged and flood-prone areas. This alternative technique is helping people grow vegetables to meet their own demands of food and at the same time, they are earning sufficient income on the sale of the produce. Strategies that have been adapted by the communities for “increasing income through alternative livelihoods” are *mele* (reed)cultivation and the subsequent use for the production of mats , apiculture and honey production, crab fattening, animal husbandry, duck rearing, shrimp-fin fish co-production in enclosures (*ghers*), to name just a few. At household and community levels, a good number of deep (hand) tube wells, rainwater harvesters have been installed during 2005 to 2008. The Union Parishads which followed a planned development pathway had successfully adapted to risks from water logging and drainage impediments. The benefits of re-excavation of canals and removal of obstacles to facilitate drainage by the installation of small-scale water structures (i.e., culvert etc.) had paid great social dividend. Local political masters have started to believe that they can indeed solve local level problems, can even defy adverse impacts of climate change, by adapting participatory planned development.

The awareness raising campaigns both in the communities and in the targeted schools have paid their dividends as well. Discussions with the communities showed that they were much aware of the potential implications of climate change in their locality. The saline resistant Keora saplings, now young trees have not only defied increasing salinity, but also sequestered carbon for the global benefit. The coverage of water logging has increased significantly, and has also spread in new areas. However, the stories and know-how regarding floating garden, *mele* cultivation, crab fattening have also spread. Many more people have turned a certain adverse hydro-geophysical condition into a boon - thanks to capacity building and innovation brought by the RVCC project. Floating garden is now being practiced in the Northern flood vulnerable areas such as Gaibandha and the haor of Sunamganj.

In conclusion it can be said the the RVCC project, in its pilot phase, introduced a number of effective strategies for adapting to climate change in South West Bangladesh. These tested and proven strategies can be replicated in other parts of the country and other parts of the world facing similar climatic variability and geophysical conditions.

Enhancing Adaptation of the Coastal Youth Through Education and Awareness on Climate Change

Remeen Firoz
Ainun Nishat and Raquibul Amin, IUCN Bangladesh

An initiative has been taken to raise awareness among students and teachers in the coastal areas on issues and concerns related to climate change and climate variability. Four upazilas of the Noakhali district, namely: Sadar, Subarnachar, Kabirhat and Hatiya (including Boyarchar) have been brought under this pilot initiative. This initiative is being implemented by IUCN Bangladesh in partnership with Char Development and Settlement Program (CDSP) III. The main objective of this project is to educate the young generation of coastal communities about climate change and to create enabling environment to face the challenges of climate vulnerabilities for appropriate adaptation and preparedness measure. The major activities of the project include: development of a ToT guide book for teachers; publication of pictorial book, poster and stickers; establishment of student networks within schools; observance of landmark environmental events through art competition and debate; documentary film on science, impact and adaptation to climate change and so on. This paper reports response of the local communities towards this initiative and how various activities and outputs have been influenced and shaped up based on their feed back.

Spare-Time University - the Consortium for Capacity Building (CCB) at the University of Colorado

Dr. Michael H. Glantz
Director and
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Research Associate, University of Colorado, Colorado, USA

Education, like water, conventionally flows uphill to money - those with disposable income can afford formal education of self and family members, while those without such income are forced to treat education as a luxury and not a human right. Within such a paradigm, disciplines have been defined and curricula has been developed through top-down systems that stream narrowly restricted notions of "knowledge" directly back down to more money, thereby creating a closed cycle of limited access and bounded possibility. Community-based mechanisms, on the other hand, can level the terrain by recognizing the value of the local or traditional knowledge that is often left out of the conventional education loop.

Climate change, however, because of its predicted effects on the assumed and accustomed patterns of climate, weather, and water upon which local and traditional knowledge is based, presents a challenge to the continued efficacy of these community-based mechanisms, which have been honed over generations to meet the particular needs of local populations based on those anticipated patterns. Most traditional systems will not have a cultural 'memory' of these new, rapidly onrushing patterns, and will struggle to adapt to them solely through their locally developed knowledge systems. In many cases, cultural resilience will require access to 'outside' knowledge systems. In response to these impacts of climate change, the Consortium for Capacity Building at the University of Colorado proposes the concept of "Spare-Time University" (STU). Taking advantage of "teachable moments" by promoting "usable science" for community-based adaptations, the concept of STU is intended to meet these coming challenges by facilitating ready access to 'outside' information that can inform local decision-making about what might otherwise be unknown (or little known) potential impacts and threats of climate change. Disseminated through cost-effective, readily available technologies (e.g. mobile phone, radio and satellite radio, MP3 and MP4, emerging wireless technologies, face-to-face meetings, printed products, etc.), knowledge once only accessible in traditional classroom or conference settings becomes available to all who require information about issues that directly threaten their lives and livelihoods. In essence, the concept of Spare-Time University localizes knowledge that has conventionally been considered 'outside,' not encroaching upon but bolstering the promise of community-based adaptations to climate change. If information is power, then sharing information is empowering.

Promoting the Role of Women in Coping with Water Crisis in Saline-prone and Drought-prone Areas of Bangladesh

Nazria Islam, Senior Research Officer
BCAS and
Zakia Naznin
Research Officer, BCAS

Safe drinking water is a basic human requirement and water security is an important aspect of livelihood. But there is severe crisis of drinking water in certain areas of Bangladesh due to increasing salinity, arsenic in ground water, drought, irregular terrain, flood and falling groundwater table, which primarily have a negative impacts on health and livelihood of various communities. Climate Change has aggravated the scarcity of safe water situation and this problem of scarcity will deteriorate further with time because of the already established negative impacts from climate change.

Keeping the significance of safe drinking water in perspective in terms of availability, accessibility and quality, especially for the poor households, and importantly the women as they play a major role in collection and use of the water. A project named 'Drinking Water Security for the Poor and Women' was initiated jointly by BCAS and AMRF Society, with financial support from ICCO, The Netherlands and Christian Aid, UK. Further more, since the poor and women in the fringe areas have rarely participated or contributed to the conventional processes of development programmes, this project was designed to take into consideration the need to develop interactive and participatory practices in promoting drinking water security for the poor. The project also took into account the climate change impacts in terms of water availability and quality. The steps taken by the project were participatory research and action, social mobilization, appropriate technology demonstration and community-bed institutional arrangements.

Of the five project locations, Rajshahi and Bagerhat districts are badly affected by drought, erratic rainfall, salinity and tidal inundation and possible sea level rise, which in turn are causing the scarcity in safe water availability. Therefore, to tackle the problem of scarcity, relevant appropriate technologies have been introduced to the local communities. These includes rain water harvesting in salinity prone coastal and deep-set pump in drought prone area. As mentioned above women play a key role in the collection and management of the water for their households for different purposes. Through the various initiatives taken by the project the women have become more aware and mobilized about how to cope better with the crisis they face due to the scarcity of safe drinking water and have also become more pro-active in taking initiatives on their own to promote the long-term sustainability of the project approaches in securing water for their families in saline and drought prone areas.

Community Based Adaptation of Tribal Women to Climate Change in Semi-Arid India

Purabi Bose
PhD Fellow, India

The effects of climate change on indigenous peoples are evident from various studies. This paper presents an empirical result of the impacts of recurring droughts on indigenous communities in the semi-arid districts of western India. It examines the root causes of drought in this region, indigenous people's perceptions of drought-related vulnerabilities in relation to climate change, and relevant action to combat the problem. Further, the author analyse the adequacy of policy response and community adaptation strategies. Briefly, the study shows that several policy options failed to reflect the development of the area leaving indigenous peoples vulnerable to climate change. It shows that tribal community based adaptation initiative to mitigate the effect of lack of finance after crop damage from drought and their sole dependence on forests (as safety net) has been overcome through women's self-help groups in the villages. The paper concludes with recommendation that community based adaptation should be identified and prioritized in the policy for implementation of drought-risk reduction activities.

Making Sense: Accounting endowed wisdom of people of Bangladesh in climate change adaptation and disaster risk reduction

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The presentation explores the endowed potentials of the rural people anchored in their indigenous knowledge tradition harvested from their enduring experience of dealing with dynamic change condition caused by multiple exposures including climate change, recurrent natural hazards and a range of social, economic and legal uncertainties that they experience in daily life. Endowed wisdom in dealing with such multiple stress condition might build immense resilience to shocks may perhaps be considered as the basic strength of the disaster risk reduction and climate change adaptation in Bangladesh. People survive and adapt to such change scenario, most of the time without any intervention from outside, under different critical fragile conditions. Disaster risk reduction and climate change adaptation are a few terms of convenience academicians and professionals utilize in vitalize the narrower differences, where people deal these things in relation to their life and livelihood and their 'well being' at the end is the only sense they want to make. People have been coping with multifarious adversities and various types of pressures on their livelihoods for hundreds of years. In their everyday life struggle, the indigenous knowledge and coping strategies sustain to be the essence of survival though the uncertainty is much more dynamic than they anticipate due to climate change. In recent days, however, successive years of crop failures and significant erosion of livelihood support systems due to over exposure of natural hazards have severe effects on the performance of livelihood enterprises and coping ability, which demands a sensible look to the whole of community based approach in adaptation or disaster risk reduction. The critical task before us is to decide how we can utilize endowed wisdom of people in facing more dynamic and higher uncertain environmental risk (future risks) with present resources.

THEME

COMMUNICATION

Seeking Livelihood Adaptation through Communication for Development

Mario Acunzo

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Community-Based Adaptation (CBA) implies a multi-stakeholders action, innovation and a process of social learning for adaptive livelihoods and capacity building. Within this framework, communication, plays a key role to facilitate knowledge sharing, participation and to enhance rural institutions capacities to assist small farmers to face climate change challenges. CBA requires communication methods and tools to deal in an integrated manner with climate change issues, in order to:

- involve communities through participation and dialogue;
- discover with farmer's appropriate technologies, livelihood options and sound economic practices;
- share knowledge through improved advisory services, such as Farmer and Climate Field Schools, demonstrations, field days etc.

Communication for Development is an approach promoted by FAO and other development agencies. It is central to CBA as it combines participatory communication methods and processes with a variety of media and tools, ranging from rural radio to Information and Communication.

The FAO's Communication for Sustainable Development Initiative (CSDI) is documenting and sharing good practices on the use of communication for CBA and it is piloting out strategies and services in selected pilot areas, namely: Congo, Jamaica, Bangladesh and Bolivia. These experiences will be brought at the specialist from the above mentioned countries.

The Missing Link: Role of the Media in Communicating Adaptation

T V Padma

South Asia Coordinator, Science and Development Network, India

Knowledge about adaptation – and how to do it – is growing fast but most of it remains confined to international expert meetings, scientific papers and institutes. Many hundreds of millions of people need information on adaptation and the mass media is only effective way to reach them, yet experts are rarely using this channel to reach the vulnerable. The result is that little information on adaptation filters down to communities in developing countries that are projected to bear the brunt of global warming.

Journalists play a key role in communicating information on climate change simply, shorn of technical jargon, to the public. But journalists in most developing countries lack access to key information and experts. Those who do want to cover climate change get little support from local research organizations and climate-related agencies, while donors treat media and communications support as an afterthought. The problem is two sided... Editors too need to be sensitized to give a higher priority to the topic in their publications and broadcasts.

This presentation reviews media coverage of adaptation in developing countries and argues for greater support for the media in this sector. It also highlights role of a few foundations and organizations in trying to address this need in developing countries and how much more needs to be done.

Mainstreaming Communication for CCA: Case studies from the Congo, Bangladesh, and Jamaica

Esperance Bayedila
Federica Matteoli, Cleofe Torres, Maria Protz

Community-Based Adaptation (CBA) implies a multi-stakeholders action, innovation and a process of social learning for adaptive livelihoods. Within this framework, Communication plays a key role to facilitate knowledge sharing, participation and to enhance rural institutions capacities to assist small farmers to face climate change challenges.

The three case studies underline the importance of ComDev for CBA and in particular for natural resource management (NRM), disaster risk management (DRM), and livelihood adaptation.

- **Democratic republic of Congo:** NRM is an important component for CCA and the CSDI is supporting the Rehabilitation Programme of the National Agricultural and Forestry Research System of the Democratic Republic of Congo through a communication Action Plan where the use of rural radios, participations of civil society and rehabilitation of extension systems play an important role.
- **Bangladesh:** livelihood adaptation is the key element of the support that CSDI is doing to FAO projects in Bangladesh to develop CCA. CSDI is developing a communication action plan for: institutionalization of the learning process; replication of good adaptation practices through the Climate Field School approach; up-scaling and mainstreaming successfully pilot tested livelihood adaptation options into development planning and policy decision making.
- **Caribbean region:** the increasing of DRM aspects is another consequence of CC. CSDI is developing an Action Plan to increase public awareness, environmental education, participatory communication and community engagement in decision-making towards sound strategic communication planning processes in support to NRM, CCA, DRM and food security.

Building capacities in communication and ICTs applications for CBA

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Federica Matteoli
Food and Agriculture Organization (FAO) of United Nations, Rome, Italy

Capacity building is key to establish sound climate change adaptation processes, as well as for framing adaptation within development goals. This is particularly significant in Community-Based Adaptation (CBA), where empowering communities is fundamental in order to strengthen their capacity to face climate shocks.

Information and Communication Technology (ICT) can play a major role for the development of climate change adaptation strategies. Particularly, ICT can be employed in five different levels:

- **Observation:** data collection at global, national and local level;
- **Analysis:** data and capacity sharing, as well as interpretation of possible climate change scenarios and system mapping;
- **Planning:** design of community-based adaptation initiatives.
- **Implementation and management:** translation of adaptation strategies into action, networking with stakeholders at every level and human/natural resources management.
- **Capacity building:** awareness raising, advocacy, training and formal education programmes.

Finally, to capitalise the full potential of ICT as a driver for community action, every intervention should be formulated within the Communication for Development (ComDev) framework. A two-way bottom-up and top-down communication system is critical for facing climate change related issues, therefore ComDev is essential to foster community participation, build on local resources and knowledge sharing among different stakeholders.

Voices for Climate Change Adaptation in NRM: the need for communication

M Protz, CARIMAC

This presentation discusses the critical importance of the “*Communication for Development*” (ComDev) approach in ensuring that the voices of all stakeholders are heard in the decision-making process that will be needed in Agricultural Adaptation to Climate Change, but especially illustrates how ComDev can engage those whose livelihoods are most vulnerable and most dependent on natural resource bases. Illustrative examples will be drawn especially from Small Island Developing States (SIDS) in the Caribbean, including the “Voices for CC” initiative in Jamaica as well as best practices in ComDev from RARE Radio in St. Lucia, Toco Radio in Trinidad, among others.

THEME

DISASTER & CLIMATE CHANGE

Livelihood Reconstruction and Disaster Management in Sidr Affected Area: South khali as a case

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Over one year has already passed by since Super Cyclone Sidr inflicted heavy damage on lives, property and infrastructure as well as demolished the livelihood system of the local people in up to 30 districts. Approximately 8.9 million people in Bangladesh, were badly affected who required large-scale humanitarian aid. Shelter, food, water and sanitation remain a priority, and relief operations are still ongoing to thousands of survivors in order to help them withstand the threats of starvation, diseases and other adversities. In this context, the aim of this research is to evaluate the post Sidr livelihood reconstruction activities and the scope of adopting community risk mitigation measures taken South Khali union in Sarankhola upazila under Bagerhat District as a case. The study area is one of the highly affected areas by the devastating Sidr and witnessed a higher death toll followed by Patharghata of Barguna District. The study found that lots of governmental and nongovernmental activities are currently operating to counter this and to rebuild the livelihood system of the study area, but the problem persists and the people are struggling to cope with yet another burden. The study also reveals that issues of disaster management are not focused here up till now by any of the working NGOs of the study area or even the government. However, it is also found that several multidimensional food security activities like agro-forestry and community level disaster risk mitigation approaches have been adopted by several communities and individuals. The study concludes both early recovery and longer term recovery, and rehabilitation projects with sufficient resource allocation based on the locality.

Adaptation to Climate Change for Sustainable Disaster Risk Reduction: A Perspective from Bangladesh

Shah Mohammad Ashrafal Amin

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Sareka Jahan

Programme Officer, Bangladesh Disaster Preparedness Centre (BDPC)

Climatic disasters are on the increase as the Earth warms up - in line with scientific observations and computer simulations that model future climate. 2007 has been a year of climatic crises, especially floods, often of an unprecedented nature. In case of Bangladesh, SIDR was a practical evidence of global warming. Due to high sea water temperature (27°C), the intensity of SIDR was much greater than anticipation. Since hazards are growing in number, more people are being affected by them because of poverty, powerlessness, population growth, and the movement and displacement of people to marginal areas. The total number of natural disasters has quadrupled in the last two decades - most of them are floods, cyclones, and storms.

Since climate change has increased the frequency and intensity of natural hazards, the traditional Disaster Risk Reduction (DRR) practice is under threat. This paper shows how climate change throws challenge to existing DRR practice and making people more vulnerable to frequent natural hazards. It includes how adaptation to climate change would be a principle component of DRR approach as well as would be able to address the future impacts on livelihood. At first, the climate change trend in Bangladesh has been analyzed and potential threats of extreme climatic events have been assessed in order to incorporate climate change issues into DRR approach. In this paper current DRR practice has been compared with the adaptation strategies to better cope with natural hazards. And from this assessment, the necessity to incorporate adaptation mechanisms into DRR has been drawn.

Foundations for the Future: Children at the Heart of Community-Based Climate Change Adaptation and Mitigation

Thomas Tanner
Mercedes Garcia, Jimena Lazcano, Fatima Molina,
Grace Molina, Gonzalo Rodriguez, Baltz Tribunalo, and Frances Wallington, IDS, UK

Children and young people are commonly represented in the climate change and disasters literature as passive victims of 'natural' events. As such, the focus has tended to be principally on their protection during extreme events, and planning for their future. This presentation critiques this discourse, drawing on experiences of child-led efforts for disaster risk reduction, climate adaptation and mitigation in the Philippines and El Salvador. Participatory approaches are used to explore how children, young people and adults perceive climate risks, and how they have responded through a variety of child-led community-based initiatives.

The results demonstrate the required elements and imperatives for putting children at the heart of disaster risk reduction, adaptation and mitigation efforts. They show how mixed approaches to child participation are necessary to maximise both inclusion and impact, and highlight some of the challenges for community based approaches seeking to include and serve the needs of children and young people. The presentation concludes that successful development of strategies at community level requires acute attention to both the household level and linkages between community organisations and wider socio-political institutions.

Linking Climate Change Adaptation, Disaster Risk Reduction and Social Protection: Can Social Protection Approaches Provide Opportunities to Help People Adapt to Climate Change?

Mark Davies, Katy Oswald and Tom Mitchell
IDS, UK

By exploring the relationship between climate change adaptation, disaster risk reduction (DRR) and social protection, researchers at the Institute of Development Studies (IDS) have developed the concept of "adaptive social protection". Adaptive social protection involves examining the role of social protection in strengthening adaptation, for example, in developing more climate-resilient livelihoods.

Adaptive Social Protection is based on the following hypotheses: i) Comprehensive social protection that aims to prevent impoverishment and protect, promote and transform livelihoods and social relations, provides significant opportunities to help people adapt to climate change; ii) Social protection policies and programmes need to consider climate change in order to effectively address the multiple risk and vulnerabilities faced by the poor and excluded; iii) Developing social protection approaches for climate change adaptation requires a rigorous evidence base and an improved understanding of social impacts and policy and implementation processes.

This presentation will outline linkages between the climate change adaptation, DRR and social protection and identify good practice within current social protection mechanisms. It will also make recommendations for policy-makers and practitioners, including issues to be examined further, challenges to be met and gaps in knowledge to be filled.

Indigenous Understanding of Disaster and Health Security

Papreen Nahar (Ph.D)
Fariba Alamgir, Iftekhar A. Shuvra
Abbas Bhuiya (Ph.D)
IUB, Bangladesh

Rapid increase of frequency and intensity of natural disaster of Bangladesh is evident. In a resource poor context, disaster impact on health is well documented. However, health impact on disaster requires further exploration. This paper is based on a study that explored the indigenous knowledge on health security in order to develop a health security framework for the disaster preparedness programme. Although disaster of Bangladesh has been studied from various dimensions, very little is known about the indigenous and different local understanding of disaster and its link with health. Understanding disaster from people's perspective is important in order to contextualize the problem which is crucial to design any intervention programme. Data was collected using Focus Group Discussion and Indepth interview from three purposively selected disaster prone areas in Bangladesh, Matlab, Chakaria and Nilphamari. It was found that although local people indicate the link between health and disaster, they conceptualize health security in terms of good food, livelihood resources and good income. Access to health facility is considered a minor indicator of health security. People also differentiated between individual health security and community health security.

Global Forum For Natural Disasters Mitigation: Global Partnership For Mitigation and Adoptions for Climate Changes

Prof. Narendra Kumar Choudhary, Secretary General and
Dr. R.C. Bhattacharjee
Professor and Director of Global Research Institute of Management & Technology, Haryana, India

The Global Forum for Disaster Management, GFDM was inaugurated during the fourth World Water Forum at Mexico for effective partnership between north and south for mitigating impacts of climate changes. In recent past the communities around the world witnessed number of disasters like Extreme Climate Changes, Tsunami, earthquakes, cyclones, hurricanes, Forest fires etc. The tsunami tragedy along the south Asian coast changed the lives of millions of affected people in Asian countries. Several NGOs around the world played an important role in provision of immediate rehabilitation for the victims of the tsunami. Recognizing the social responsibility, ISDR; Open University Geology Society, Switzerland; UNESCO along with other organizations provided immediate rehabilitation measures for tsunami-affected people in our country. For life to return to normal for the tsunami-affected population, systematic-scientific and technology-based efforts are needed. Also rehabilitation work should focus on cost-effective methods for tsunami rehabilitation. This global forum for disaster management is working for mitigating the climate changes, the relation between the socio-economic dimension and scientific and technological methods and relevance to early rehabilitation programme in various parts of the world. ISDR along with Muktainagar-Taluka Education society, Open University geological society, Switzerland has accepted the responsibility of providing necessary infrastructure and Institutional help for Global forum for disaster management for conducting research and development and work related to natural disaster management and extreme climate changes. This presentation is based on the lesson learned from the GFDM-disaster management and mitigation in the Asia-Pacific-Europe-Africa region through the community based adoptions and participation of civil societies, local communities, NGOs and academic and research institutions for social and ecological management during extreme climate changes, natural disasters etc.

Protect and Transform: Christian Aid's Approach to Building Resilient Communities

Cristina Ruiz
Project Manager, Christian Aid London and
Jessica Dator-Bercilla
Programme Officer, Christian Aid, Philippines

The presentation uses the results of recent evaluation of the national projects of the Building Disaster Resilient Communities program in Bangladesh, Honduras and Malawi and the experiences of the on-going national programmes of Philippines and El Salvador to present the resilience-building working model and explore its applicability to Community-based Adaptation projects.

Evolving from 10 years of experiences in community-based disaster risk reduction projects, the model uses the concept of resilience to combine research, advocacy and service delivery under an asset-based frame to produce significant changes in shorter periods of times, effectively reducing climate-related disaster risk in the conditions of poor communities around the world. Its capacity to address simultaneously several sources of vulnerability, integrate under a single frame disaster management and climate change adaptation, or bridge relief and development are other valuable characteristics of this new working model.

The presentation will provide specific examples from our national project in Philippines which illustrate the application of this model at national level.

Bridging the Gap: Integrating Climate Change and Disaster Risk Reduction

Rebecca Joan McNaught
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red Cross/Red Crescent Climate Centre

The climate is changing and communities in some countries are already feeling that. Climate Information in the form of trends and forecasts, combined with tried and tested disaster risk reduction measures, can help anticipate disasters before they happen and enable communities to prepare for and cope with them. Fundamental to this approach is strengthening partnerships between the humanitarian sector and those working in the field of climate change. National Societies in the Asia-pacific region have been showing the way in this important area.

THEME

URBAN & CLIMATE CHANGE

Climate Change Vulnerability Mapping in Urban Area: A Case Study in Khulna City

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Mizanur Rahman, Caritas Bangladesh

Urban centers build various infrastructures to support economic activities and the needs of city dwellers. Population growth rates in most cities are higher than national growth rates, particularly in the developing and Least Developed Countries. Moreover most of the cities in the developing countries are located either on the bank of a river or in the coastal zone. Many cities are at risk from climate change impacts such as sea-level rise, floods and extreme weather. Climate change threatens the homes, water supply, health, infrastructures, livelihoods and health of the urban poor. The study has been conducted under City and Climate Change project supported by CLACC programme of IIED.

City development authorities or agencies normally conduct spatial city planning based on historical data and information. Climate change related extreme events and gradual changes are rarely considered in city planning or in designing infrastructure. There is also a lack of city level risk and vulnerability maps in the developing and Least Developed Countries, which is necessary to facilitate awareness raising, planning and decision making processes for a climate resilient urban settlements. The study concentrates on visualizing climate related problems at city level for raising awareness and building consensus of the city planners and managers. The study conducted literature review, identification of existing climate related problems, preparation of draft vulnerability maps through a brain storming session with relevant stakeholders. This study also organized a review meeting and ground checking of the draft maps and data. The study developed a set of maps (base and vulnerability) of Khulna City. Base map includes location of the city, administrative map, river system, location of water bodies, population density, landuse and landuse change, transport network and vulnerability map includes drainage condition of the city, water logging area, location of slum and dam to identify probable affected area. These would be useful for the city planners and environment/climate experts.

Towards Poor Urban Population's Climate Change Adaptation: The case for Harare, Zimbabwe

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In Harare, Zimbabwe, challenges such as rising population, unemployment, brain drain, breakdown of services provision, poor quality water and sanitation and poor planning are a challenge.

The paper show that Temperatures are rising and heavy but intense rainfall leading to flooding is damaging the sewage and clean water reticulation infrastructure, causing disease outbreaks, whilst rising temperatures and water puddles has increased malaria incidences in Harare affecting the special interest groups such as children, the elderly and women and the immuno- compromised patience.

Urban people's livelihoods were destroyed all in the name of slum upgrading in Harare. This approach is unsustainable and reinforces poverty, vulnerability and inequality. Assisting local communities to establish security of tenure and sustainable alternatives to forced eviction is a crucial starting point for tackling urban poverty in Zimbabwe.

The paper covers how the federation of the homeless members are getting assistance to mapping out their settlements, accessing appropriate technical support for construction or facilitating negotiations with local government.

Vulnerability has been minimised by schemes like community Savings schemes, or community managed funds, which are assisting urban poor community households in securing tenure of property in the form of land by putting up proper structures which they can invest in. Other several tools that communities use to minimise their vulnerability to climate change are also highlighted. A number of organisations including CBOs are engaged with this. One of the organisations are Dialogue on Shelter in Zimbabwe, supporting CBOs like Zimbabwe Homeless People's Federation.

The paper ends by focusing on the low levels of Climate Change awareness among the city's stakeholders and recommending on what can be done to curb this.

Urban Poverty, Adaptation to Climate Change and the Built Environment

Huraera Jabeen
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Urban poverty in Bangladesh is evident in all the towns and cities. It is estimated that 43% of urban household live below the poverty line among which 23% are considered extreme poor. Around 35% of the population of six major cities live in slums which cover only 4% of their land area with limited or no access to services and poor living conditions. Bangladesh is considered highly vulnerable from the threat of climate change and climate variability. Various predictions of sea level rise puts 55% of the population of Bangladesh on the threat of inundation. In recent years the recurrence of natural disasters has increased the vulnerability of the urban poor who are considered to be most affected from climate change and climate variability. Fighting poverty in urban area requires a multi facet approach of economic, social, cultural, political as well as physical agendas. The development practitioners and designers of built environment, working to improve the condition of the urban poor, now face new challenge to accommodate issues arising from climate change and climate variability. The aim of the presentation is to identify the issues related to urban poverty, climate change and the built environment, and to discuss the future priorities and measures that can be taken at different levels related to the built environment in Bangladesh.

Victims to Victors, Disasters to Opportunities: Community Driven Responses to Climate Change in the Philippines

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In recent years, research agencies and NGOs have increasingly incorporated climate change within their development work, believing they have the skills, experience, local knowledge and networks to undertake locally appropriate vulnerability reduction activities that increase resilience to a range of factors including climate change. This is particularly evident through the recently emerging discourse of community-based adaptation (CBA). However, there has been little systematic examination of the ways in which existing experiences of dealing with hazard events can inform community-based adaptation. This paper analyses the experience of the Homeless People's Federation of the Philippines (HPFP) in respect of community-led disaster responses, with the aim of informing future discussions on the role of CBA.

The paper examines the response of the HPFP to three disaster events in low-income urban communities: flooding in Iloilo; a mudflow in Bikol; and a fire in Mandaue City. These events caused widespread loss of life and destruction of property, yet at the same time acted as a catalyst for deeper and more meaningful collective action by urban residents and local organizations. These responses generate several lessons for community-based adaptation to climate change, including the importance of collective savings at the level of the community; the significance of partnerships with the state, particularly at the local level; and the centrality of land and shelter in the lives and livelihoods of the urban poor. Together, an empowered process can help to ensure pro-poor outcomes to climate change adaptation, integrating protection from adverse climate change with other community development needs.

THEME

MAINSTREAMING ADAPTATION
& PARTNERSHIP

Adaptation as Deliberative Institutions: Enhancing Local Participation in Climate Technology Investments in Asia

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Adaptation is often defined as strengthening physical defenses against future climate change, but can also include increasing socio-economic opportunities as a means of reducing social vulnerability. This paper discusses potential institutional designs of community-based adaptation that can enhance local participation in climate change policy, and allow a greater acknowledgement of local definitions of the "development dividend" arising from climate change investments. The paper focuses on examples of investment in waste-to-energy projects involving methane capture and community gathering of waste in India, the Philippines and Thailand, where international investors have needed to incorporate the views of local citizens in the siting and selection of new technologies. The paper argues that climate change policy needs to consider the institutional design of such partnerships between investors and communities as an important part of building adaptive capacity in poorer countries. The paper also makes suggestions for how governments, local actors and climate change policy can collaborate under conditions of more or less uncertainty about technological impacts and contractual complexities.

Integrating Adaptation to Climate Change into Development Aid Policies. Short Term Versus Long Term Approach

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Climate change and its impacts on human societies exacerbate some development issues. This problematic became recently a fundamental issue for development aid policy makers. Growing environmental deterioration will be a strong challenge to short-term gain of poverty reduction. On the contrary, investing in environmental sustainability could be a way to achieve higher economic and social returns. How can development aid support this path - is the question we propose to explore in this paper.

The vulnerability and the lack of capacity of developing countries regarding climate change have been many times underlined. Therefore, the "mainstreaming" of adaptation as a transversal development issue has become a priority in the international policy texts these last years. There is a gap between the discourse and the practice of development aid. Action bringing short-term gains are favored by development institution. Climate change is a problematic issue, because it implies taking action based on climate scenario. These are not exempt from large uncertainties. However tackling this issue will be necessary. It will in return bring gain in term of such sustainable development, since "traditional" development issues as poverty alleviation and other MDG, are challenged by climate change impacts.

In Western Africa, we have performed in-the-field observations of adaptation strategies. Moreover, we have carefully analyzed the policy papers and practices of EU aid policy and its relations to adaptation to climate change. In this paper, we propose to highlight the relevance of integrating adaptation to future climate change impacts, as an asset to reach traditional goals of development and as a mean to avoid future economic, social and human losses.

CBA Initiatives: The Experience of Caritas Bangladesh

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Climate change in Bangladesh is expected to bring temperature increase, sea-level rise, increasingly erratic and intense monsoon rainfall and increased prevalence and intensity of flood and drought. This will lead to substantial impacts on ecosystems and resources. A number of major studies in the past investigated the causes of vulnerability of Bangladesh due to climate change. Most of the adverse effects of climate change will be in the form of extreme weather events, while water-related hazards such as flood, drought, salinity ingress, river bank erosion and tidal bore are likely to be exacerbated, leading to large scale damages to crop, employment, livelihoods and national economy.

Caritas Bangladesh has been working since 1971 to reduce the vulnerability and alleviate the sufferings of the poor and the disadvantaged parts of the community. The activities that Caritas carried out earlier have been linked to the adaptation activities. To reduce drinking water scarcity in the coastal area Caritas developed a model for harvesting rainwater at household and community level and over the years and it has been well progressed by the GO and NGOs. In drought prone area, Caritas re-excavated more than 600 water tanks and a large number of canals for storing water as irrigation under the Drought Recovery Project (DPR) in early 1980s.

Recently Caritas is being piloting adaptation activities *i.e.* rainwater harvesting for drinking, year round kitchen gardening, solar pump for effective utilization of irrigated water, pond re-excavation for household water use, technology and information center for knowledge sharing and introduce saline as well as drought tolerant crops where climate conditions have already changed. The CBA program has built community-led adaptive capacity and reduced climate change risks that communities face, and in turn to facilitate sustainable community management of natural resources and to influence policy and institutional arenas.

Women and Water for Development: A Practical Journey to Food Security and Poverty Reduction in Africa

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Administrator Kwabina Yeboah Enterprise Ghana and Administrator,
Women International Coalition Organisation (WICO) Africa, Topical

Agriculture is the main source of Africa's food supply and prime source of livelihood for millions of people in rural areas in Africa. Irrigation for agriculture consumes large quantities of freshwater but many countries in Africa still depend on rainfed agriculture. Poor management of Africa's natural resources has led to pressure by the growing population leading to land and water degradation. Global food production will have to increase by 60% from 2000 to 2030, to meet growing demands resulting from population growth. This requires a 14% increase in water used for irrigated agriculture. Irrigated land, which represents only about 20% of the world's farmland (even less of Africa's farmland), produces around 40% of the world's food supply and 60% of cereals. Though more productive than rainfed agriculture which is common in Africa, irrigation is coming under close scrutiny for the relatively poor yields, considering the resources used. Growing water scarcity in many regions including Africa calls for a much more productive use of water in agriculture and for the transparent water allocation mechanism between sectors, giving special attention to the needs of the environment. During the 'Water for Life' Decade and beyond, a greater effort to help farmers across Africa produce food of better quality with less water and less stress on the environment. The role of women farmers can not be over emphasized as women in Africa produce about 80% of the food though mostly in the informal sector. Only then can we expect to meet the goals of food security, poverty eradication and environmental sustainability. Hence, following recommendations are put forward:

Recommendations:

Put the right policies in place: The need to employ policies that provide farmers with the right incentives to allow them to contribute to Africa's economy through sustainable agriculture practices that make productive use of water, in both rain-fed and irrigated agriculture.

Ensure the women have equal access to resources: The need for women to have access to land, appropriate technology, water and research, and involve them equally in decision-making.

Investments: The need to support individual farmers/ farmers co-operative and the private sector to develop efficient agriculture from public investments.

Improve governance and radically change the way water is managed with Africa's agricultural sector: Water users at levels in Africa must be involved in the planning and management of irrigation and empowered to make decisions through appropriate mechanisms such as water users associations. Water services must become much more flexible, reliable and equitable to ensure productivity gains in agricultural water use.

Continued research and capacity building of key stakeholders: The need for continuous research and capacity building of key stakeholders in sustainable agriculture techniques, appropriate technologies and efficient water usage and sustainable farming.

Foreign Aid and Adaptation to Drought in Rural Tanzania

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In sub-Saharan Africa, an estimated 200 million people are malnourished and chronic food and freshwater insecurities intensify as climate patterns change. International donor agencies have responded to these interlinked problems by devoting more attention to adaptive capacity. The ability of individuals and communities to undertake deliberate adaptations in anticipation of different hazards. It is imperative that research keeps pace with this new donor priority so that we can characterize more accurately the limitations and opportunities of adaptive capacity in different contexts and inform future interventions. The research aims to identify how donors can help to expand access to institutions—arrangements of rules that condition human behavior, such as collective irrigation schemes, crop cooperatives, markets, and microcredit banks—that allow vulnerable households to adapt to environmental change. Beginning last winter, I examined an aid-funded resource governance project in Rufiji, Tanzania. The poorest district in Tanzania, Rufiji comprises a population of about 200,000 farmers and fishermen. Two important questions animate this research:

- (1) How do multiple institutions interact to affect farmers' access to individual and collective strategies (e.g. diversification of livelihood activities, crop development and irrigation, and market exchange) that would help improve productivity and secure basic needs during drought?
- (2) How are efforts to improve adaptation outcomes vulnerable to typical "development" pitfalls experienced throughout the history of development assistance?

More than Rain: Identifying Sustainable Pathways for Climate adaptation and Poverty Reduction

Gitte Motzfeldt

Development Fund, Norway

The current climate situation and future scenarios bring new. If increased risks. The development thinking and planning needs to change and development organisations need to become more systematic in addressing climate variability and change. With this background the "More than Rain" project was initiated as a learning process in collaboration with some of our local partners in Ethiopia, Nepal and Nicaragua, and with the Global Environmental Change and Human Security project at the University of Oslo.

We have learned that there are many national and local barriers that negatively effect people's ability to increase their adaptive capacity. At the same time we believe there is a tremendous amount of untapped potential and opportunities for people to improve their livelihood situation and increase their resilient to external and internal stresses. However, in order to use this potential, we need to identify and strengthen people's perceptions, knowledge, values and culture and somehow merge it with support to new and innovative ideas for livelihood improvements.

"More than Rain" seeks to understand the adaptive capacity that can be enhanced. The aim of this study and report is to provide insights and guidance on how to address climate change adaptation in development interventions. The report has three objectives. The first objective is to present a method for examining poverty reduction projects and programs in order to identify, plan, monitor, and evaluate climate adaptation activities. The second objective is to identify what sustainable adaptation measures can look like in on-the-ground development projects. Specific examples drawn from three projects supported by the Development Fund illustrate the potential for promoting development paths that both reduce poverty *and* increase people's capacity to respond to climate change. The third objective is to present some guiding principles for the design and implementation of climate change adaptation in poverty reduction strategies and activities.

Norwegian Church Aid and Climate Change

Claes Book
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We learned that a comprehensive long term approach to adaptation to climate change is needed in order to address poverty in ways that reduce climate risk and vulnerability and increase the capacity to respond and adapt to climate variability and change. Climate adaptation activities should be planned and executed within a vision of building long-term resilience in local communities. A comprehensive approach recognizes that interactions between climatic and non-climatic factors are decisive for the way climatic challenges influence people's livelihoods and quality of living. Climate change adaptation should include a holistic, yet local approach to what vulnerability means for the local population, and thus how social contexts shape vulnerability.

Climate adaptation measures must therefore be context-specific yet comprehensive, addressing a broad range of factors and scales. It is therefore an urgent need to incorporate adaptation into broader development efforts, by addressing central development challenges facing people and communities, in ways that consider how climate conditions influence these challenges. This means that adaptation activities need to be based on sufficient understanding of local livelihood strategies and contexts, poor people's challenges, efforts, values and aims and how these relate to local climate variability and change. Hence adaptation to climate risk has to be in-built into all sectors of ongoing poverty reduction and development efforts.

The Norwegian Church Aid (NCA) is a faith based humanitarian aid organization. We currently are operational in 60 countries. A majority of these country programs are in sub-Saharan Africa; the remainders are in Asia, Latin America and the Balkans. The NCA Global Strategy plan was revised in February, 2007 in order to integrate climate change issues into the plan by:

- Raising awareness on how climate change will impact poverty reduction and develop strategies on how to reduce poor people's vulnerability to climate change and to support adaptation measure;
- Building awareness with partners and local communities concerning climate change and linkages between democratic governance, sustainable management of natural resources and poverty reduction; and
- Advocating for industrialized countries to take a lead on acting on mitigation and promote adaptation to climate change.

The main focus of the programme is to Climate Adaptation reduce underlying causes of vulnerability and mainstreaming climate change adaptation by establishing approach in NCA Global Strategic Plan through: Rights based approach and accountable governance, Gender equality - woman and children already exposed, Religions for peace and conflict resolution and Poverty reduction - support poor countries' right to development.

NCA puts forward climate change adaptation in long term development work through promoting renewable energy, improving coping mechanisms in agriculture and settlements and rainwater harvesting

Advancing Community Adaptation to Climate Change by Building Local Capacity in Coastal and Floodplain Ecosystems in Bangladesh

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Global climate change has devastating local impacts particularly in the developing countries though the problem was mainly created by the rich of the developed countries. Bangladesh is one of the most vulnerable countries to climate change impacts due to its geophysical location, pace of socioeconomic development, weak institutional arrangement and lack of local capacity. The increasing temperature rise, erratic rainfall, drought, salinity intrusion in coastal region, drastic changes in seasonal patterns and extreme climatic events like cyclone, tidal surge, frequent and prolonged floods etc., are affecting the country, its population, society, economy and the livelihoods of the common people. The poor and marginal communities in the coastal and floodplain ecosystems are worst affected by natural hazards and various climatic risks because of their lack of awareness and capacity to deal with the problems.

Considering the increasing climate change risks and vulnerability of the poor, BCAS, in association with local development agencies, has undertaken an action research to promote community adaptation to climate change mainly through building the local capacity of vulnerable communities, key actors and stakeholders. The Christian Aid, UK is supporting the innovative initiative. The overall goal of the project is to reduce climate risks and vulnerability by enhancing resilience of the vulnerable communities through building of local capacity and promoting collective actions. The project takes learnings from earlier experiences in relation to climate risk reduction and promotes a participatory and interdisciplinary approach.

The biophysical impacts of climate change are primarily external and the local community has little capacity to resist the impacts by their own efforts. Unfortunately the action from the developed countries and global communities to stop climate change is very inadequate. The capacity of the community and individuals to reduce the climate risks is, to some extent, internal within a community as part of a society and this local capacity to reduce climatic risks could be enhanced through awareness building about climate change trends, its impacts and the associated risks and vulnerability, information and knowledge sharing for effective engagement of community and actors, motivation, preparedness actions, skill development, innovation and technology generation as well as institutional support for the affected communities. Hence, community adaptation strategy under this initiative takes local capacity building of the vulnerable community and key actors as a key means to engage them for gaining better and shared understanding about the risks, vulnerability and collective responses to protect the lives and livelihoods of the communities from climate variability and extreme events.

Bridging the Gaps between Community and the Climate Change Issues and Adaptation Challenges: Case of Bangladesh

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This paper aims at capturing some of the critical gaps which are identified as barriers to smooth adaptation to climate change at the community levels. Some of those gaps so far identified in this paper are: (i) gap in development approach in general and communication gap in tracking climate variability and community preparation in particular; (ii) gaps between national institutions and community; (iii) knowledge gap between adaptation scholars, practitioners and policy makers and community at the grassroots; (iv) gaps in building synergies in development research related to adaptation; (v) gaps in research and implementation procedures; (vi) gaps in location specific need responsive actions; (vii) gaps in appropriate knowledge on long term impact of structural solutions; (viii) gaps between pure climate and hydrological science and social science; (ix) gaps in perspective planning vision between traditional and emerging climate change scenario and (x) gaps in adaptation technology adoption and mainstreaming.

Implementing the climate change adaptation at the broad based community scale requires an appreciation of the links between climate change impact and national development goals and a knowledge based understanding of how to incorporate adaptation matters into different sectors of the economy. Thus, policy makers in Bangladesh would benefit if they could examine climate and poverty linkages, identify investments that could result in potential win-win solutions and understand how to cost out these investments. Decision makers would benefit from an improved understanding of conceptual as well as practical linkages between climate change scenario and development. It would also be useful to identify the tools and techniques available for improving growth and reducing the negative impacts on the livelihood.

Community level adaptation in the UNFCCC process

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This paper describes the activities under the United Nations Framework Convention on Climate Change (UNFCCC) related to community-based adaptation. Negotiations on adaptation have progressed over the past few years and community-based adaptation, as a subset of the larger adaptation field, falls within the ambit of different negotiating bodies that operate under the Convention. The paper will discuss the relevant bodies as well as the work programmes and activities mandated by the bodies. These include the Nairobi work programme on impacts, vulnerability and adaptation to climate change, under the Subsidiary Body for Scientific and Technological Advice (SBSTA); decisions and activities under the Subsidiary Body for Implementation (SBI); National Adaptation Programmes of Action (NAPAs), under the Conference of the Parties (COP); as well as views and progress under the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA).

To complement the discussion, three case studies are described in the paper. These are case studies found in the UNFCCC local coping strategies database, and they illustrate grassroots-level adaptation projects. They are representative of three different types of hazards that are encountered by different communities all over the world, are taken from different regions, and serve to illustrate how adaptation can be implemented with only local initiative and support. The examples given also illustrate techniques that can be replicated in other communities facing similar impacts of climate change, and highlight the need to share knowledge in order to achieve this. The first example deals with drought, and comes from Eastern and Southern Africa. It demonstrates community-based adaptation in the form of shifting cattle enclosures, in order to improve the fertility and water-retention ability of the soil. The second example deals with floods, and comes from South East Asia, where affected communities diversify their normal rice-based diets during the flood season. The third example deals with hurricanes and their related impacts, and is taken from The Caribbean, where agro-forestry practices have been integrated into local agriculture as a means to mitigate the impacts of hurricanes, which are increasingly occurring in the region.

The paper concludes by highlighting the need for knowledge sharing, so that local knowledge and adaptation techniques can be transferred to, and replicated by, communities facing new challenges as a result of climate change. It will also highlight the need for engagement by a wide range of stakeholders, to ensure that this knowledge sharing, as well as the planning and implementation of community-based adaptation assists communities to deal with the negative effects of climate change.

Community-Based Implementation and Compliance of MEAs - Biodiversity Related Issues in Linkage to Climate Variability (CICMEA)

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Global concerns such as climate change and loss of biodiversity require concerted efforts among various stakeholders and institutions along with close association among other Multilateral Environmental Agreements (MEAs). Therefore, effective coordination and implementation of activities among MEAs and related action plans will improve the effectiveness and utilization of fund within the limited resources. In 2008, International Union for Conservation of Nature (IUCN) Bangladesh Country Office, United Nations Environment Programme (UNEP) and United Nations University (UNU) supported a project entitled "Community-based Implementation and Compliance of MEAs - Biodiversity related issues in linkage to climate variability". The goal of the project is to improve the role of communities in effective implementation of MEAs.

To this end, the project reviews, assesses and validates the role of communities and community-based knowledge in effective implementation of the Convention on Biological Diversity (CBD) work programme with specific focus on issues of access to genetic resources, benefit sharing and traditional knowledge. In addition, it investigates the role of traditional knowledge and practices in conservation and sustainable use of biodiversity and adaptation to climate change, particularly at the community level. Bangladesh adopted the 'National Adaptation Programme of Action (NAPA)' in 2005 and 'National Biodiversity Strategy and Action Plan (NBSAP)' in 2006. Under the project, 25 local level and 4 district-level workshops were organized. Awareness raising and communication materials on biodiversity conservation and climate change have been developed. Furthermore, five case studies of best practice have been conducted, as well as reviews of NAPA and NBSAP status in Bangladesh. This paper aims to; (i) give preliminary findings of the project including highlighting the gaps of MEAs implementation at the local level; (ii) provide suggestions on policy implementation that incorporates local opinions; (ii) provide modalities for awareness raising and capacity building, among other for MEA implementation at the local level.

