ELLA
Evidence and lessons from Latin America

Based on a wide breadth of experiences with climate change impacts and adaptation strategies, practitioners from Africa, Asia, and Latin America discussed their local climate realities, identifying shared challenges and exploring what could be learned from one another to improve upon current climate change adaptation in semi-arid and arid regions.

STRENGTHENING ADAPTIVE CAPACITY IN SEMI-ARID AND ARID LANDS

SUMMARY

The first module of this Learning Alliance presented examples of how countries with arid and semi-arid lands (ASALs) address the challenges of climate change (CC) through adaptation, covering issues related to infrastructure, water resource management, food security, subsistence agriculture, biodiversity and migration. Although there were many successful examples and voices of optimism across these categories, findings from Module 1 show that current efforts to reduce socio-economic vulnerability to existing climate variability in ASALs are falling short of what is needed. Furthermore, the long-term planning for these efforts is lagging behind the pace of the predicted climate change impacts. Thus, Module 2 will look at dynamic strategies and practices that strengthen rural adaptive capacity, specifically livelihood diversification, asset distribution, decentralized adaptation technologies, women's empowerment within community decision-making, and the integration of indigenous knowledge into modern adaptation strategies.

Introductory Materials

Learning Alliance Module Outline, Introductory Video, Introductory Slideshow, Getting Started Survey Results, What the Learning Alliance Will Address, Key Terms

Setting the Scene: Strengthening Adaptive Capacity in Semi-arid and Arid Communities

Livelihood Diversification and Asset Distribution: A Short Introduction to Adapta Sertão

Technologies for Climate Change Adaptation in Semi-Arid and Arid Regions: Small is Beautiful (Short Introduction)

Community Institutions for Community-based Adaptation: Evidence from Latin American Drylands

Climate Change Adaptation and Gender in Semi-arid and Arid Regions

Indigenous Knowledge in Community-Based Adaptation: Evidence from Latin American Drylands

VIDEO: Technology for Climate Change Adaptation - Interview with Daniele Cesano

VIDEO: Community Institutions for Climate Change Adaptation in Drylands

VIDEO: Interview with Thais Corral on the Role of Women for Climate Change Adaptation

Expert Interview with Corinne Valdivia and Jere Gilles: Indigenous Knowledge for Adaptation in the Altiplano

ELLA Background Materials

ELLA Guide: Improving Small Farmers' Adaptive Capacity in Semi-arid Regions

ELLA Brief: Water and Climate Change: Improving Access and Management in Semi-Arid Brazil

ELLA Brief: An Integrated Approach to Improving Adaptive Capacity: The Adapta Sertao Experience

ELLA Brief: Brazil's Public Policy Package for Successful Farmer Adaptation

ELLA Spotlight on Publications: Adaptation in Semi-Arid Regions

ELLA Spotlight on Arguments: Adaptation in Semi-Arid Regions

ELLA Spotlight on Organisations: Adaptation in Semi-Arid Regions

Key Discussion Questions:

Participants in Module 2 were guided by the following discussion questions:

1. **Setting the Scene – Strengthening Rural Adaptive Capacity:** What are your experiences with community-based adaptation (CBA)? How is CBA useful for climate change adaptation, and are there possible limits to it? What are the necessary factors to increase adaptive capacity in rural communities you deem most relevant? And how do you think they can be promoted or strengthened?

2. **Livelihood Diversification Strategies and Asset Distribution:** What is your analysis of the Adapta Sertão project? Are these relevant or replicable approaches to your country or region? What is positive, what is negative? How does community-based adaptation address livelihood diversification and asset distribution in your country or region?

3. **Technologies and Methods for Climate Change Adaptation (CCA) – Small is Beautiful:** Which small-scale technologies have helped farmers to cope with current conditions in your country or region? And why were they successful? How can small-scale technologies help farmers adapt to climate change? Do you think there are limits to these technologies, and what must be done to overcome these?

4. **CCA and the Role of Women:** How do you evaluate the experiences of Latin American dryland women in coping with and adapting to climate change? Are there lessons to be learned for your context? What is the role of women for climate change adaptation in your country of region?

5. **Indigenous Knowledge in CCA:** Do you think the way that the Aymara apply their indigenous knowledge can help them to become more resilient to climate change? Can you provide cases of indigenous knowledge from your country or region that have been shown to increase adaptive capacity? Or are there cases where indigenous knowledge is already proving insufficient given adverse climatic impacts?

Key Conclusions:

Online discussions pointed to the following key conclusions regarding adaptive capacity in Africa, Asia and Latin America:

Setting the Scene - Strengthening Rural Adaptive Capacity

- Rural communities in ASALs have a long list of priorities that are in constant flux depending on a plethora of factors ranging from macro-economic domestic trends to local agricultural growing conditions

- Comprehensive community-based development projects in ASALs entail the integration of near-term community needs (such as livelihood diversification, access to credit, disaster relief and crop insurance) with long-term climatic risks (famine, drought, floods, pests, deforestation and topsoil loss for example). Participants mentioned indigenous meteorology, agrobiodiversity and organic agriculture as examples of potential areas for local-level, CBA integration

- To the extent that these indigenous mechanisms can keep pace with CC impacts, supporting and strengthening their applications can certainly boost CBA to CC
- A perplexing topic is how best to harmonise community-led processes with externally-driven adaptation initiatives led by international NGOs or governments
- Many cultures in ASALs have an engrained sense of collectivism as a coping mechanism for their harsh environs, presenting an opportunity to roadmap local-level cooperation by leveraging existing cultural traditions where they exist, even transmitting concepts to other cultures where suitable

Livelihood Diversification Strategies and Asset Distribution

- Participants were introduced to a Brazilian CBA project called Adapta Sertão (AS) located in the semi-arid northeast of Brazil, which demonstrates an integrated approach to the dissemination of efficient irrigation technologies, building capacity amongst farmers and their cooperative and increasing access to markets and microfinance
- Participants from Malawi, Nigeria, Zambia, Zimbabwe, Bangladesh and Ghana believed the AS project in Brazil offers an innovative, comprehensive approach to CBA that may be replicable in their own countries
- There were numerous examples of successful CBA programmes focusing of livelihood diversification and asset distribution including sustainable tree crop programme and underground water harvesting in Nigeria; capacity building in Nepal by linking farmers to the nearest service providers; water conservation and management, crop diversification, improved tillage practices and promoting forest-based production of edible products in Jharkhand, India and Siavonga, Zambia
- The size of the aforementioned programmes varies, with some having extended well beyond pilot phase to national-level and internationally-supported programmes
- As the challenges and vulnerability of climate change loom over rural communities, national governments have a dichotomous role to play with respect to the sway they have over the livelihoods of their peoples: on the one hand, they must incentivise diversification to increase resilience when the adoption of such measures is out of reach of the community (due to such factors as capital costs and geographic isolation); on the other hand, governments must concurrently take inventory of antiquated policies and subsidies that provide disincentives to the adoption of those same measures (for example, subsidies for mono-cropping)

Technologies and Methods for Climate Change Adaptation – Small is Beautiful

- Modernising agricultural technology and methods is usually only successful where agricultural productivity, food security and income can be improved to boost CCA in rural ASALs
- Appropriate technologies for small-scale farmers in ASALs are generally inexpensive and relatively easy to operate, maintain and repair

- Harmonising farmers' local knowledge and views with new tools and know-how certainly offers opportunities to accelerate local adaptive capacity and CBA in ASALs will allow for smoother introductions and sustained uptake of new technologies, usually introduced by organisations outside of the community
- Predicting the upcoming role and potential effectiveness of small-scale technologies under the shadow of climate change (i.e. drought, insolation, storms, floods) leaves much uncertainty as to the future biophysical limits that today's technological systems must overcome
- Worsening extreme climatic events often undermine small-scale technologies meaning large-scale infrastructure and policies must be designed to provide safety nets (or even supplant) in the event of small-scale systems failure

CCA and the Role of Women

- Climate change increases the severity and frequency of environmental crisis, concurrently, causing evermore social crisis that more often than not impact women more severely than men, especially in ASALs
- Social programmes were identified by participants as the most effective method to reduce women's vulnerability to climate change, namely by strengthening their CCA skillsets and resources (including programmes to reduce illiteracy and entrepreneurship programmes for livelihood diversification)
- Because women make many of the household decisions, programme benefits can extend well beyond the women receiving support and/or training to the wider family

Indigenous Knowledge in CCA

- Rural communities have historically forecasted rainfalls, designed planting calendars and estimated crop productivity based on natural indicators, greatly increasing their resilience to climatic variability
- Amidst climate change, the effectiveness of indigenous knowledge is under threat, meaning understanding the extent to which traditional practices can provide pathways for sustainable future adaptation is extremely relevant
- A strategy highlighted by most participants was the complimentary integration of modern climate science with traditional, indigenous knowledge as a means of identifying how to inform historical, on-the-ground experiences with data-driven climate modeling
- When possible, especially in rural ASALs, it is efficient to leverage existing indigenous mechanisms of meteorological understanding to facilitate the adoption of modern climate-related forecasting tools, which, in turn, can increase the uptake of modern scientific methods as well as the effectiveness of traditional systems – a win-win scenario

Learning Focus of Module Two

Adaptive capacity is the "ability of a system [human or natural] to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences"

- International Panel on Climate Change, 2007

Adaptive capacity is of paramount importance to individuals, families, states, countries and companies attempting to reduce their vulnerability to already unpredictable climates that will worsen with predicted changes in climate. This second module explores methods used to enhance adaptive capacity in community-led or -based adaptation projects (CBA) across the developing world.

CONTENIDO

Discussion Topic One: Strengthening Rural Adaptive Capacity

During this discussion, participants shared experiences of community-based adaptation (CBA) strategies from their countries and regions. Essential factors for increasing adaptive capacity in rural communities was identified based on participant responses, including potential ways these factors can be promoted and strengthened.

Rural communities in ASALs have a long list of priorities that are in constant flux depending a plethora of factors ranging from macro-economic domestic trends to local agricultural growing conditions. In this context, participants were quick to assert that community priorities go beyond climate risks.

> *"We must acknowledge that - apart from very few exceptions – anthropogenic climate change is only one (and probably not the most important by now) of a range of natural, social, and economic problems that poor people in these regions are or will be facing. In this sense, community-based adaptation should direct its attention to the main drivers of climate change vulnerability and its root causes. Apart from its fashion nowadays under the UNFCCC framework, decades of research have been pointing out that it is very unlikely that interventions focusing only on climate-related risks will reflect the community priorities (see, for instance, Orlove 2009). Generally speaking, the problem is not in the climate, but rather in the societal political and economic structures that construct risks and deepen social-ecological vulnerabilities to environmental changes in general and climate change more specifically."*
>
> *- Rafael Martins, Belgium*

Comprehensive community-based development projects in ASALs thus entail the integration of near-term community needs (such as livelihood diversification, access to credit, disaster relief and crop insurance) with long-term climatic risks (for example, famine, drought, floods, pests, deforestation and topsoil loss). There are, of course, many lessons that can already be drawn from communities' experiences with these risks. As a few examples, participants mentioned indigenous meteorology, agrobiodiversity and organic agriculture as potential areas for local-level, CBA integration.

> *"Local communities have been exposed to and been adapting to climate variability and climate change over long periods - accumulating knowledge on climate risks and local responses to such risks over generations. These indigenous adaptations are usually shared through traditional information transfer processes within communities and are not often defined as 'community projects' but rather as local community knowledge and practices. Such traditions include indigenous meteorology and agrobiodiversity to cope with climate variability and change. While these traditions alone may not be sufficient to cope with the rapid pace of climate change, their CBA contributions are important and should be adequately researched, documented, shared, and promoted. Also, linking modern knowledge and information to indigenous traditions presents possibilities for reciprocal knowledge systems, which will be essential to climate-related CBA."*
>
> *- Soul Shava, South Africa*

"Oilwatch Ghana uses organic agriculture as an adaptation tool to control climate change. Capacity building sessions are organised for community members by Oilwatch Ghana's staff, focusing on farmers' agricultural techniques and how they can utilise organic manure for farming in rural areas. It has been very important to check adaptation situations at the grassroots levels, tackling problems as they arise, especially in rural areas where communities are more vulnerable and little to no help is available, thereby endangering the livelihoods, ecosystems and resources of communities, often leading to migration."

- Wilson Klutsey, Ghana

To the extent that these indigenous mechanisms can keep pace with CC impacts, supporting and strengthening their applications can certainly boost CBA to CC. This view was widely expressed among participants. Having said that, there were those who expressed concern that, if not done carefully, hyper- localised and insulated efforts could actually be counterproductive.

"Sharing knowledge through relatives, peers and colleagues is an important aspect to plan, manage, and learn from adaptation measures in rural areas. These processes and practices were - and often continue to be - highly useful, but farmers have witnessed they have crossed the limit of their ability to cope with climate variability. There are certainly some limitations as well in community-based planning. Amidst the cascades of uncertainty from climate change, farmers alone are not in a position to predict and plan accordingly. Due to this, their adaptation measures are not as effective as they once were, thereby running the risk of mal-adaptation to climate change. It is observed that CBA is essentially planned for the short term and, sometimes, it fails to incorporate the big picture – overlooking things such as ecosystem services."

- Ram Chandra Khanal, Nepal

"Eastern Sri Lanka has been affected by multiple disasters during the past several decades. The war that broke out from 1983 to 2007 led to repeated displacement of people, deaths, disappearances, disability and forced recruitment by armed groups. The area is often affected by floods and droughts. Many communities also still experience attacks by wild elephants. While donor- and government-led interventions are numerous, they are seldom coordinated, and communities need to resort to coping mechanisms that tend to reverse development processes and the wealth accumulation paths of the household. Vulnerability assessments need to be carried out at the community level, and structural, as well as non-structural interventions, need to be carefully planned."

- Federica Chiappe, United Kingdom

As well as these community-led processes, there are, of course, adaptation actions driven by external actors such as international NGOs and governments. The question is then how both can be aligned in order to benefit communities, and how CBA can interact in this context. After all, many of the factors that exacerbate the vulnerability of farmers and their families are not isolated to the local level, but also have origins in regional and national policies.

"Indigenous knowledge-based adaptation usually lacks requisite institutional capability, modern technology, and sufficient investment. Therefore, such adaptation processes are short-term and only reduce low-level climate change risks. CBA, when supported by national governments and donors, usually has significant institutional capability developed through training and awareness development programmes, supported by sufficient financial and technical resources."

- Syed Amdadul Huq, Bangladesh

"CBA is a complex issue. It needs both institutional actors at the district, provincial, national and global level, collaborating with community-level actors - such as social groups and cooperatives. We tend to generalise the vulnerability levels of communities when, in fact, each community has its own story to tell. What normally happens is that an international-based organisation comes into the country and introduces a tool to use at national level and, once the national teams are trained, they go to the provinces, districts, and, lastly, the communities. The reason this approach is used in most cases is because communities lack sufficient knowledge (e.g. a climate vulnerability assessment is needed to develop a programme strategy). So, as the expert, you will go in and train them using a participatory approach. The community will give you all the information, you help them with the assessment, and then you help them develop an action plan. You prepare a report and send the community a copy. Months later, you go back to find nothing has been implemented and ask why? Trained community members are not practising. The reason? Lack of finances for implementation. This goes for conservation, agriculture and water harvesting. This year we have tried to do things the other way round, getting members from different communities to come to the national platform to train as climate champions and we found out that there was a knowledge gap which would make it hard for the community members to go back and replicate the work. What can increase adaptive capacity in rural communities is placing people to live and work in the communities until they adopt the change you are implementing. In addition, you need to identify and work with people from the community who are dedicated and committed to increasing the community's adaptive capacity; not just people after financial gain only."

- Kizita Shula Mwamba, Zambia

Kizita was not alone in her detailed analysis and frustration, as many other participants shared similar stories of CBA programmes fizzling out due to lack of know-how and financing. However, an equally detailed case from Nigeria showed that there is hope for CBA in developing countries ASALs.

"Since 2007, the Nigerian Environmental Study Team (NEST) has implemented "Building Nigeria's Response to Climate Change (BNRCC)", which incorporates CBA pilot projects to test small-scale adaptation options in communities throughout Nigeria. NEST partnered with seven local organisations, which then selected communities in their respective operational areas to test various CBA strategies. Each partner organisation, after receiving training on social analysis systems for communities, proceeded to their chosen communities. They started with stakeholder analyses of the communities to identify the most vulnerable and influential groups. Communities selected their own local Project Implementation Committees (PIC), made up of interested local stakeholders,

which were fully involved in the projects from design to completion. After that, historic timelines were developed to examine key changes affecting the community. In the process, we study major climate hazards that have impacted the community to analyse which resources are important for adaptation and which options are available to improve existing coping strategies. CBA project opportunities identified by PICs were subjected to impact and feasibility tests, which brought out the ones that could be achieved within the time frame of the project and achieve the maximum social benefit. In this way, projects were selected and implemented. The pilot projects took place in 15 communities spanning Nigeria from the Sahel in the north to the coastal/rainforest region in the south. Examples of the pilot projects include: increasing food security by introducing early maturing/improved crop varieties; testing alternative livelihood options such as aquaculture in order to provide a means of income and to reduce the reliance on dwindling forest resources; providing fuel efficient wood stoves; improving access to water sources to deal with water scarcity; and tree planting for ecosystem rehabilitation especially to stabilise dunes that are taking over farmlands and villages in the north. BNRCC funding was secured from the Canadian Development Agency (CIDA), providing resources for implementation and the monitoring and evaluation (M&E) of each project. More complete descriptions of each pilot project, provided as case studies, are available at www.nestinteractive.org."

- John Ajigo, Nigeria

Lastly, and this is especially important for developing local institutions to enhance adaptive capacity, is the extent to which cultures embrace collectivism.

"*Zimbabwe appears to still be a long way off in terms of having community-led institutions that address local issues and advance local developmental priorities. In societies where collectivism is not strongly embedded in the local culture, having such community led institutions can be problematic.*"

- Leonard Unganai, Zimbabwe

This is not all bad news, however, since many cultures in ASALs have an engrained sense of collectivism as a coping mechanism for their harsh environs. Maybe this is an opportunity, a sort of roadmap to local-level cooperation through leveraging these cultural traditions where they exist, even transmitting concepts to other cultures when suitable.

"*It's noteworthy that the majority of rural communities in sub-Saharan Africa have traditional cultures that once epitomised collectivism. Examples from Zimbabwe include the 'Zunde raMambo' where households would contribute grain to the chief, which would be used to support vulnerable groups or be used as a safety net in times of famine. As we look at local institutions playing a role in adaptation, we need to revisit some of these indigenous traditions, and bring some formalisation to them in order to enable transactions in a modern economy. It's not going to be easy but, if adaptation is to be efficient and succeed, then the way forward for governments is to empower local institutions as the essential functional unit of adaptation.*"

- Jimmiel Mandima, United States (USA)

Discussion Topic One – Key Lessons

- Rural communities in ASALs have a long list of priorities that are in constant flux depending a plethora of factors ranging from macro-economic domestic trends to local agricultural growing conditions
- Comprehensive community-based development projects in ASALs entail the integration of near-term community needs (such as livelihood diversification, access to credit, disaster relief, crop insurance, etc.) with long-term climatic risks (famine, drought, floods, pests, deforestation, topsoil loss, etc.), with participants mentioning indigenous meteorology, agrobiodiversity and organic agriculture as examples of potential areas for local-level, CBA integration
- To the extent that these indigenous mechanisms can keep pace with CC impacts, supporting and strengthening their applications can certainly boost CBA to CC
- A perplexing topic is how best to harmonise community-led processes with adaptation initiatives driven by external actors such as international NGOs and governments
- Many cultures in ASALs have an engrained sense of collectivism as a coping mechanism for their harsh environs, presenting an opportunity to roadmap local-level cooperation by leveraging existing cultural traditions where they exist, even transmitting concepts to other cultures where suitable

Supplementary Materials

Participants were provided with the following resources in preparation for Discussion One:

- Adaptation, adaptive capacity and vulnerability (Smit and Wandel, 2006)
- Community-based adaptation to climate change: an overview (Reid et al., 2009, pp. 11-33)
- Setting the Scene: Strengthening Adaptive Capacity in Semi-Arid and Arid Communities

During the exchange, participants shared additional resources and links to relevant organisations for those interested in exploring this topic further:

- Oil Watch Ghana

Discussion Topic Two: Livelihood Diversification Strategies and Asset Distribution

This discussion focused how livelihood diversification and asset distribution relate to adaptive capacity. Participants were presented with material on a Brazilian CBA project called Adapta Sertão ("Adapt Sertão!" in English, or AS for short). Located in the semi-arid northeast of Brazil (i.e. the "Sertão"), the AS project began in 2006 as a strategy to disseminate solar PV-based water pumps among smallholder farmers, but soon developed into an integrated approach to disseminate efficient irrigation technologies, buildcapacity amongst farmers and their cooperatives, and increase access to markets and microfinance. Livelihoods and assets are thus at the core of this project approach.

Participants were asked to analyse the Adapta Sertão project and surmise whether similar projects would be relevant or replicable in their own countries. Overall the project was well received across all regions.

> *"The Adapta Sertão project is very interesting. The project presents an innovative idea in rural ASALs by acting as a catalyst to building linkages between project stakeholders, including both service users (farmers) and providers (e.g. irrigation vendor). It focuses on maintaining active stakeholder participation, thereby working to create more opportunities to build trust among stakeholders and ensure the sustainability of the project. The strategies and approaches of the Adapta Sertão can be replicated in other similar areas. It supports smallholder farmers on technology transfers, capacity building, and increasing access to micro-credit, which is a very good strategy to develop farmers' entrepreneurial endeavors. However, in developing areas where smallholders are very poor, then additional contributions and support from the project (e.g. to help secure physical assets) may be required in order to reach the initial capital needed by the poor farmers."*
>
> *- Ujjal Tiwari, Nepal*

Participants from Malawi, Nigeria, Zambia, Zimbabwe, Bangladesh and Ghana believed the AS project in Brazil offers an innovative, comprehensive approach to CBA that may be replicable in their own countries. These participants pointed to microfinance, crop diversification, value chain improvements, market linkages, training and capacity building, technology kits (for example, solar water pumps) and local stakeholder engagement as the key aspects of AS' success. In many cases, participants had their own experiences with similar projects within their own countries.

> *"In our pilot project in southeast Zimbabwe we could not include those two dimensions and we could tell that something was missing as farmers kept complaining about lack of access to markets. An important lesson we learnt was that access to high value markets can be a big incentive for farmers to adopt new productivity enhancing technologies. Surely in the absence of income opportunities what's the point in increasing productivity a farmer would ask? We have tried livelihood diversification in our semi-arid southeast Zimbabwe by promoting non-*

agricultural strategies with limited success. The livelihood options included national resource management (NRM) for trophy hunting, fish production and captive crocodile breeding. The cost of NRM appeared to far outweigh the benefits leading us to wonder whether it was the best land use option for the rural farmers. For crocodile breeding, the farmers could handle the production side very well but not the business side. This is where I find your AS model very innovative. The idea of bringing a number of stakeholders along the value chain is important for adaptation. We have not always done this. Having read the AS case study one wonders how well some of adaptation initiatives in Zimbabwe could have performed if we had adopted a similar inclusive approach. You have shared with us very useful information for our future programming."

- Leonard Unganai, Zimbabwe

"My key concern with the AS and which perhaps would be problematic in my country is the financing of hard technologies such as irrigation. Many rural family farms have no access to finances let alone micro-finance. Unless the government provides subsidy, it may be difficult to achieve the effective adaptation."

- Monica Chundama, Zambia

In addition to insufficient funds for micro-finance programmes, other shortcomings identified by participants for similar CBA programmes in their countries included insufficient development of local research capacity and incomplete multi-stakeholder engagement. Despite these few select examples of pending challenges, there were numerous examples of successful CBA programmes focusing of livelihood diversification and asset distribution. They include a sustainable tree crop programme and underground water harvesting in Nigeria; capacity building in Nepal by linking farmers to the nearest service providers; water conservation and management, crop diversification, improved tillage practices, and promoting forest-based production of edible products in Jharkhand, India and Siavonga, Zambia. The size of the aforementioned programmes varies; some have extended well beyond pilot phases, such as the one in Bangladesh mentioned by Syed Huq.

"From 2005-2009, a project titled "Livelihood Adaptation to Climate Change" was jointly implemented by the Department of Agricultural Extension and the UN's FAO, which had a project area that covered four drought-prone sub-districts, where about 83% of rural households were involved directly in farming. About 31 adaptation practices were analysed under seven adaptation options, namely: agronomic management; water harvesting; water recourse exploitation; water use efficiency; crop intensification; alternative enterprise; alternative energy sources; and post- harvest practices. The project implemented demonstrations of adaptation options in farmers' fields, working in close partnership with farmers and technical support teams from research institutes other relevant organisations. More than 292 demonstrations of 15 viable adaptation technologies were implemented during five cropping seasons. The preferred technologies identified by the project included jujube gardening, excavation of mini ponds, homestead vegetable cultivation, transplanted aman rice, and chick pea cropping patterns, and improved rural cook stoves. The main challenge has been maintaining the continuity of the project's achievements with respect to the restoration and improvement of the livelihoods."

- Syed Amdadul Huq, Bangladesh

As much as national government involvement can be a boon to community livelihood diversification and asset distribution, its policies can conversely create perverse incentives that contribute to maladaptation, as demonstrated by the dialogue between Learning Alliance members from Africa.

> *"The multi-pronged approach used in AS makes is highly commendable. The promotion of multi-cropping in order to reduce crop loss is an aspect that has been used in traditional agriculture in southern Africa. In Zimbabwe, modern agriculture practices, through the help of agriculture extension workers, have discouraged multi-cropping among rural small-scale farmers, replacing it with mono-cropping, a practice which has dire consequences on the farmer in the case of crop failure. Mono-cropping also has its associated ills of farmer dependence on hybrid seed varieties from seed companies, on synthetic fertilizers and on herbicides and pesticides."*
>
> *- Soul Shava, South Africa*

> *"Soul, I appreciate your arguments. Sometimes it is also national subsidies for single crops (in the name of food security) that deter multi-cropping. The comparative advantages of regions are never really considered because food security is linked to one crop and its related seed support, inorganic fertilizers, storage and marketing arrangements."*
>
> *- Monica Chundama, Zambia*

Thus, as the challenges and vulnerability of climate change loom over rural communities, national governments have a dichotomous role to play with respect to the sway they have over the livelihoods of their peoples. On the one hand, they must incentivise diversification to increase resilience when the adoption of such measures is out of reach of the community (due to such factors as capital costs and geographic isolation, amongst others); on the other hand, governments must concurrently take inventory of antiquated policies and subsidies that provide disincentives to the adoption of those same measures (e.g. subsidies for mono-cropping).

The international community also plays an important role in terms of influencing the scaling-up of these types of programmes.

> *"Bangladesh won the 2012 Earth Care Award Adaptation Project. The Ministry of Environment and Forests (MoEF) of Bangladesh won for spearheading the Least Developed Countries Fund (LDCF) project called "Community Based Adaptation to Climate Change through Coastal Afforestation in Bangladesh". The project has a strong CBA component and benefited 18,269 households by involving them in afforestation, agriculture, livestock and fishery-based livelihood adaptation. One of the significant adaptation response measures used is the development of FFF (Forest-Fish-Fruit) Model, a mound-ditch model that comprises short and long-term resource and income generation, as well as livelihood diversification. This model is used in barren lands, located behind coastal mangrove forests. By using a combination of protective and productive vegetation, mound and ditch land structures, the FFF model has prevented land encroachment and ensured water security through rainwater harvesting in ditches."*
>
> *- Mousumi Pervin, Bangladesh*

As was shown by participants' contributions, there are numerous actors working to increase the climate resilience of rural communities by securing the assets and means by which they derive their livelihoods. One thing is certain, and this has been mentioned in previous sections: the community and its will power provide the central building block to the formation of an effective CCA programme.

> *"Livelihood diversification and appropriate assets could be - often must be - a central component of any effective CBA; but they are only part of broader strategy. First and foremost is the inner urge of the community to feel a need for CBA, second are the steps taken by that community toward achieving that goal. This urge (and example) may start at the individual level and then spread to the "community". This spread could be quick and natural, in the case of traditional and tribal communities as compared to urbanised communities. This element of "community feeling" is very important to have spontaneous, CBA. It means, if the community has the will – even rudimentary interventions can galvanise them to take action; otherwise, absent this will of the community, even full-scale interventions will be futile."*
>
> *- Hari Shanker Gupta, India*

Discussion Topic Two – Key Lessons

- Participants were introduced to a Brazilian CBA project called Adapta Sertão (AS) located in the semi-arid northeast of Brazil, which demonstrated an integrated approach to disseminating efficient irrigation technologies, build capacity amongst farmers and their cooperatives, and increasing access to markets and microfinance
- Participants from Malawi, Nigeria, Zambia, Zimbabwe, Bangladesh and Ghana believed the AS project in Brazil offers an innovative, comprehensive approach to CBA that may be replicable in their own countries
- There were numerous examples of successful CBA programmes focusing of livelihood diversification and asset distribution including sustainable tree crop programme and underground water harvesting in Nigeria; capacity building in Nepal by linking farmers to the nearest service providers; water conservation and management, crop diversification, improved tillage practices, and promoting forest-based production of edible products in Jharkhand, India and Siavonga, Zambia
- The size of the aforementioned programmes varies size, some have evolved well beyond pilot phase into national-level and internationally-supported programmes
- As the challenges and vulnerability of climate change loom over rural communities, national governments have a dichotomous role to play with respect to the sway they have over the livelihoods of their peoples: on the one hand, they must incentivise crop and income diversification to increase communities' resilience when the adoption of such measures are out of their reach (due to such factors as capital costs and geographic isolation, amongst others); on the other hand, governments must concurrently take inventory of antiquated policies and subsidies that provide disincentives to the adoption of those same measures (e.g. subsidies for mono-cropping)

Supplementary Materials

Participants were provided with the following resources in preparation for Discussion Two:

- The Adapta Sertão website for additional information
- BRIEF: An Integrated Approach to Improving Adaptive Capacity: The Adapta Sertão Experience
- Enhancing adaptive capacity to climate change (Simões et al., 2010)

During the exchange, participants shared additional resources and links to relevant organisations for those interested in exploring this topic further:

- Strengthening Livelihood Capacities to Disaster Risk Reduction in Nepal
- Shurugwi Partners: Chikato Orphans & Women's Economic and Social Safety Project
- Africa Biodiversity Collaborative Group: Food Security & Conservation in Africa
- Finding Optimal Trade-offs Between Food Security and Conservation in Africa: A Review of Tools and Presentation of Case Studies from Zambezi and Ituri Landscapes

Discussion Topic Three: CCA Technology and Methods for ASALs: Small is Beautiful

For this discussion, participants debeated the potential of small-scale technologies to produce big advancements in CCA among small-scale farming families. The variety of small-farmer technologies mentioned by participants was impressive.

> *"Technologies related to small-scale farming are very relevant and effective given their ability to increase the climate-related adaptive capacity of small farmers. Some technologies that have been adopted and successful in Nepal are: rain water harvesting, drip irrigation, agro-forestry, enterprise-oriented and community-based agro-biodiversity management, home gardening, integrated pest management and focus on biological control of pests, community-based seed production and promotion of local crop varieties, farmers' entrepreneurship development and increasing their access to market, value addition of products, soil organic matter enhancement (FYM application, composting, green manures, cover crops), conservation tillage, seeds priming (soaking of seeds into water before sowing/planting), intercropping, mixed farming, crop rotation with legumes integration, riverbed vegetable farming, integration of livestock into farming systems, seed and grain storage techniques, mulching to conserve soil moisture, vegetable nurseries in shade structures, cultivation of short-duration improved crop varieties, and creation of off-farm employment opportunities to diversify farmers' income.. Government and other development organisations have been involved in identifying and implementing the small-scale technologies. Technologies that are developed with the active participation of technology users and disseminated through CBA (civil society organisations, local NGOs, cooperatives, farmers groups) are more successful."*
>
> *- Ujjal Tiwari, Nepal*

To varying degrees, participants from other countries provided examples of similarly diverse mixes of technologies and methods to boost the adaptive capacity of small farmers in ASALs. Within these dry lands, water (or lack thereof) is, of course, central to most of these approaches, particularly because (i) rain-fed crops continue to play a central role in ASAL agricultural communities and (ii) droughts in these regions are likely to increase due to CC.

As was pointed out by participants, modernisation of agricultural technology and methods is usually only successful where agricultural productivity, food security and income can be improved to boost CCA in rural ASALs. Ensuring this set of factors is hard enough, but there are other prerequisites as well: technologies for small farmers in ASALs generally need to be inexpensive and relatively easy to operate, maintain and repair. This second set of prerequisites allows rural farmers to adopt new technologies with less reliance on outside support.

"Most smallholder farmers in my region around Lake Victoria encroach into the wetlands for farming and thus, during floods, lose their crops and then suffer from high food insecurity. Agricultural techniques such as multi-storey gardening, small-scale water harvesting using tube wells, and optimising crop selection have offered breakthroughs for farmers, improving crop production, reducing the effects of flooding, minimising human-wildlife conflicts and access to water for irrigation during dry periods. For technologies to be embraced, they need to be simple, robust, affordable to farmers and not labour intensive."

- Caroline Achieng Odera, Kenya

However, participants extended the discussion beyond economics, arguing that the effective path toward modernising adaptive capacity of rural life in ASAL's is as much about perspective as it is technology; for it is the former which influences decisions of whether or not to adopt the latter.

"Technological innovation can become a window of dialogue, allowing families to look out and find the vast potential that exists within their own land (such as the collection and use of rainwater). Our fieldwork at the Center for Popular and Social Education in Paraíba, Brazil started with the goal of helping families discover that the solution to what they call the "problem" can be developed on their own propriety. So, today, we have worked with a large number of families using this perspective, and, little by little, are combining their local knowledge with the technical know-how needed to use innovative, low-cost technologies within the economic reach of small farmers. We think this is also very useful for climate change adaptation in ASALs."

- Ruth Zlochevsky, Brazil

Therefore, harmonising farmers' local knowledge and views with new tools and know-how certainly offers opportunities to accelerate local adaptive capacity and CBA in ASALs. Participants noted that the introduction of new technologies frequently takes place due to initiative from actors outside the community. Helping local farmers identify with the technologies, and also giving them a sense of ownership is another essential point, which must be balanced with the role of external actors such as NGOs. As conditions worsen in ASALs, as they are predicted to due to climate change, maintaining this balance will become all the more important.

Even so, the large-scale dissemination of small-scale innovations remains limited in ASALs due to inadequate access to resources for farmers.

"In Malawi, technologies to adapt to climate change are mainly applied in the agricultural sector are being proposed by the government and development partners. These technologies include conservation agriculture, irrigation

agriculture, and crop variety diversification. The challenge is that only a small portion of small-scale farmers are able to get support for these technologies, especially in terms of training and use. This is mainly due to insufficient funds to support the use of these technologies at a large scale."

- Frank Kamanga, Malawi

"Uptake of small-scale technologies seems to be limited in the short term by inadequate access to credit and information on climate forecasting; in the long term, they are limited by a lack of information on the suite of adaptation technologies available, their functions, and the inputs needed to operate them. The lack of funding and seeds limit the farmers' ability to get necessary resources and technologies. What should be done to overcome limits to small-scale CCA technologies is to provide more access to credit, information (climatic and agronomic) as well as access to markets (inputs and sales), which can significantly increase farm-level adaptation. Therefore, government policies need to support research and development that fosters and diffuses the appropriate technologies to help farmers adapt to dynamic climatic conditions."

- Monica Chundama, Zambia

The upcoming role and potential effectiveness of small-scale technologies under the shadow of climate change was not entirely clear to participants. Broadly speaking, climate change in ASALs is predicted to decrease water availability and increase drought frequency. This is, of course, important because farmers in ASALs are already vulnerable to today's climatic variability and structural deficits (for example, social exclusion and inadequate resources). While technological innovation under current conditions is justifiable for purely socio-economic and ecological reasons, the dynamic nature and uncertainty of impacts from climate change may impose biophysical limits on many technological systems in the future.

"Technological innovations are being criticised because they are not necessarily contributing to the adaptive capacity of communities facing major climate change impacts. In other words, lack of climate-smart technologies, ownership, and sustainable management may make most technologies short-lived and ineffective. Furthermore, costly technologies may not be easily replicated across communities. Thus, integrating CCA principles in the design and selection of technologies – be they small or large - can greatly enhance resilience to climate change impacts and reduce criticisms."

- Simon Shomkegh, Nigeria

Other options, such as entrepreneurial development strategies include market development, creating value-added processes and reducing requirements for manual labour. Importantly, participants added that these

climate-smart technologies, per se, are only part of a much broader CCA process of successful capacity building in rural ASALs. An important question remains: what exactly does climate-smart mean, particularly in the context of ASALs?

> *"In 2011, a case study of the Dangbe East District, in Greater-Accra in the southern part of Ghana, revealed that innovations adopted by farmers to contain drought conditions included irrigation, construction of wells for water storage, mulching to improve the water- holding capacity of soils, planting of soil cover crops, cultivation close to water bodies, regular weed control, and early plowing and planting. The study demonstrated how sudden drought conditions reduce crop yields, and often lead to crop failure. Common innovations used by farmers to reduce effects of severe drought include: storage of water for irrigation, mulching and application of organic manure to improve the water-holding capacity of soils, cultivation of short maturity crops and varieties as well as drought resistant crops and varieties. Despite these available opportunities, there are limitations to the application of these innovative technologies. These include the high cost of production due to escalating input prices, high prices of staple food crops as farmers switch to cash crops and threaten food security, price variability of certain crops, and post- harvest losses which aggravate poverty and health risks associated with agro-chemical applications. Furthermore, some of the aforementioned technologies are beyond the economic reach of resource poor farmers. Examples cited were the high cost of irrigation facilities, high costs of double nursery establishment and cost of improved varieties."*
>
> *- Stephen Awuni, Ghana*

Participants from all ASAL developing regions strongly agreed that extreme climatic events often undermine small-scale technologies. What, then, are the actions to be undertaken when technologies fail, for example, in times of severe droughts? Of course, at the national level, investments in big infrastructure such as larger and deeper dams continue to be in the focus, but with much more limited benefits to rural family farmers.

> *"Water resources in South Africa are a critical element supporting economic development activities and are a national priority as South Africa is rated the 11th most water scarce country in the world. The national government is currently developing a National Water Resources Strategy (NWRS) to complement the existing water act and various other by-laws regulating water use and supply. Unfortunately, some government departments still view technology in the water sector as the construction of larger and deeper dams, and putting in place infrastructure for bulk water transfer to water scarce regions of the country. Hopefully this is fast changing as the current thinking, at least among environmental NGOs in the country and some parastatals, is around managing water resources from an ecosystem and holistic landscape perspective. Technology will always be limited by the availability of the water resources and it is important to start investing in managing the natural landscape to allow natural replenishment, supply and flow of ecosystem services in the form of adequate quantity and quality across the landscape."*
>
> *- Farayi Madziwa, South Africa*

Discussion Topic Three – Key Lessons

- Modernising agricultural technology and methods is usually only successful where agricultural productivity, food security and income can be improved to boost CCA in rural ASALs
- Appropriate technologies for small farmers in ASALs are generally inexpensive and relatively easy to operate, maintain and repair
- Harmonising farmers' local knowledge and views with new tools and know-how certainly offers opportunities to accelerate local adaptive capacity and CBA in ASALs will allow for smoother introductions and sustained uptake of new technologies, usually introduced by organisations outside of the community
- Predicting the upcoming role and potential effectiveness of small-scale technologies under the shadow of climate change (i.e. drought, insolation, storms, floods, etc.) leaves much uncertainty as to the future biophysical limits that today's technological systems must overcome
- Extreme climatic events often undermine small-scale technologies meaning large-scale infrastructure and policies must be designed to provide safety nets (or even supplant) in the event of small-scale systems failure

Supplementary Materials

Participants were provided with the following resources in preparation for Discussion Three:

- Water and Climate Change: Improving Access and Management in Semi-Arid Brazil
- Technology for Climate Change Adaptation - Interview with Daniele Cesano
- Strengthening Agrobiodiversity: A Key Adaptation Strategy for Latin America's Mountain Ecosystems
- Technologies for Climate Change Adaptation (Clements et al., 2011)

During the exchange, participants shared additional resources and links to relevant organisations for those interested in exploring this topic further:

- Contribution of Rainwater Harvesting Technologies to Rural Livelihoods in Zimbabwe: The Case of Ngundu Ward in Chivi District
- Drivers of Change in Global Agriculture

Discussion Topic Four: CCA and the Role of Women

Women in ASALs are highly vulnerable to the adverse impacts of climate change. They face more difficult challenges given their status, relationships, responsibilities, opportunities, constraints, and uneven access to and control over resources. On the other hand, women can no longer be considered as passive victims to climate change and other challenges. During this discussion, participants shared experiences from ASALs in developing regions, showing how women are coping with climate change and its inherent socioeconomic stresses. Examples were also provided of how women are increasingly seen as agents of enhanced CCA.

> *"Women will always seek alternatives when the going gets tough in order to cope. The key lesson here for me is the ability of Latin American women to begin with small things and nurture them to become big. Another lesson is the willingness of Latin American women to cooperate even under severe household restrictions, via mechanisms such as 'Self-Help' groups, to arrive at small-scale sustainable solutions. It is worth noting that these women are also agents of change who offer a ray of hope for Climate Change Adaptation. These are key lessons and potentials that we have to use in the Semi-Arid North of Ghana."*
>
> *- Samuel Adoboe, Ghana*

Participants concurred that when climate change tips the dominoes of environmental crisis onto social crisis, often, women are more severely affected than men.

> *"Malawi is now experiencing a huge male out migration due to climate change along Lake Chilwa. Historically, the lake sustained many nearby communities that depended on it for fish farming as a source of food and income. Now, with it dry, most men and women are left jobless, pushing men far away from the lake in search of greener pastures. This situation has left most women practically helpless, with the burden of taking care of their children. Consequently, women are resorting to prostitution to support their families. As a coping strategy, the government, private sector and civil society organisations are engaging the communities in sexual reproductive health training and providing contraception. Some women are also provided with entrepreneurship trainings and start-up grants for businesses to seek different livelihoods."*
>
> *- Frank Kamanga, Malawi*

This example is one of many similar stories told by participants across all regions. Rural women in Benin are often left alone to look after their families when their partners migrate to cities in search of work. Widespread illiteracy among rural Nigerian women makes CCA information dissemination at the family-level difficult. For Nepalese women, climate shocks and environmental degradation make women's labour-intensive daily tasks including drinking water collection, searching for firewood, cooking food, caring for children and farming activities all the more difficult.

In terms of solutions, the most common response among participants from all regions was to improve social programmes in order to reduce women's vulnerability to climate change by strengthening their skillsets and resources for CCA.

> *"In India women's self-help groups (SHGs) are very active. In my project, Jharkland Tribal Development Society, there are many SHGs operating. Initially, the climate change component was not included as a topic of these SHGs; however, now, it is apparent that the women of Jharkhand are working quite actively to improve their adaptive capacity, thanks to empowerment from SHGs. These change are (1) Elevating financial status and empowerment (2) Saving money for coping with future risk in the form bank deposits (3) Creating linkages with insurance policy (4) Diversifying livelihood activities away from high-risk, climate-vulnerable activities (5) Reduction of input intensive agriculture/fishery/horticulture practices (6) Promotion of organic farming (7) Better health care and drinking water."*
>
> *- Hari Shanker Gupta, India*

Many other developing ASAL regions are working diligently to enhance women's participation in the process of increasing their respective communities' adaptive capacity. In Nigeria, women can attend night classes provided by the government. Amidst social crisis caused by environmental fallout from resource constraints and overuse, self-determination and healthcare were taught to women in Malawi vis-à-vis sex education and contraception programmes provided by the government. Microfinance programmes in both Nepal and Tanzania are helping to create female entrepreneurs and keep men from out-migrating during climate shocks. Because women often make family-level decisions, benefits here can extend well beyond the women receiving support and/or training.

Discussion Topic Four – Key Lessons

- Climate change increases the severity and frequency of environmental crisis, concurrently, causing evermore social crisis that more often than not impact women more severely than men, especially in ASALs
- Social programmes were identified by participants as the most effective method to reduce women's vulnerability to climate change, namely by strengthening their CCA skillsets and resources (examples include programmes to reduce illiteracy and entrepreneurship programmes for livelihood diversification
- Because women make many of the household decisions, programme benefits can extend well beyond the women receiving support and/or training

Supplementary Materials

Participants were provided with the following resources in preparation for Discussion Four:

- Video Interview with Thais Corral on the Role of Women for Climate Change Adaptation
- Women, Gender Equality and Climate Change (UN Women Watch, 2009)
- Powerful Synergies: Gender Equality, Economic Development and Environmental Sustainability (UNDP, 2012)
- Gender and Dryland Management: Gender Roles in Transformation (FAO, 2003)
- Climate Change and Gender in Latin American Drylands: A Short Introduction

During the exchange, participants shared additional resources and links to relevant organisations for those interested in exploring this topic further:

- Evolving Land Tenure Systems and Sustainable Livelihoods in Northern Ghana
- Women and Property Inheritance after Intestate Succession
- Women's Contribution to the National Economy Deserves Recognition

Discussion Topic Five: Indigenous Knowledge in CCA

Indigenous knowledge is a crucial component for CBA. Rural communities have historically forecasted rainfalls, designed planting calendars and estimated crop productivity based on natural indicators.

> *Indigenous knowledge is a collective memory that is conveyed verbally [and via other forms of communication] from generation to generation through songs, tales, actions, and observations.*
>
> *- Fathiya Abdulmajid, Kenya*

This has greatly increased their resilience to environmental change, and may continue to do so in the future, even under increasing climatic variability and extreme events. However, as will be shown below, the effectiveness of indigenous knowledge will likely be diminished by climate change. Understanding how traditional practices can provide pathways for sustainable adaptation is thus extremely relevant. Participants reviewed a case study on Andean traditions and generally agreed that the Andean people called the Aymara had increased their adaptive capacity by leveraging their indigenous knowledge, which was used to cope with the region's climatic variability.

> *"Modern scientific information is rarely location specific. Rather, it covers a broad area with different conditions such as mountains, valleys, plains - areas with different activities such as livestock grazing, various suitable crops, and location-specific planting seasons. For years, Aymara communities have relied on location-specific weather information that has been useful in coping with the variability of nature. Modern information is packaged in a form that is difficult for rural communities to find useful applications, usually due to their low levels of education."*
>
> *- Damian Casmiri, United Republic of Tanzania*

Other participants shared examples of how indigenous knowledge has been applied in their own countries, which included rather lengthy, comprehensive lists of impressive CBA methods.

> *"The Aymara can still apply their indigenous knowledge, but with the advent of unpredictable climate change their resilience probably needs to be increased by incorporating modern technology. In Zimbabwe, indigenous knowledge is well recognised, especially in rural communities in dry lands. For example, changing from cattle to goats and even sheep in times of hardship has proven to work well, since, in most cases, there is less pasture to feed cattle that normally require a lot more fodder in periods of drought. Rural communities have also learned to rely on native plants, which are more tolerant to drought and pests. Local chiefs prohibit the felling of certain species of trees and hunting of certain animals, such as the pangolin and python. The construction of stone dykes and fallow systems of cultivation encourage the conservation of forests, while the use of local seeds for generations has given*

communities better yields during dry periods, even compared to conventional seeds (which are also normally expensive for rural communities). These are just some of the examples of indigenous knowledge that have kept communities adapting to the effects of a changing climate for decades."

- Maxwell Kanotunga, Zimbabwe

However, participants also stressed that in many of their regions indigenous knowledge systems are struggling to keep pace with a rapidly changing, unpredictable climate.

"In the Gorori community of Bauchi, Nigeria, where we did some CBA pilot projects, we found out from our preliminary investigation that the farmers rely heavily on the location of the nests of birds, called Samua, to estimate the timing of the onset of rains for their planting. When the birds put their nests on top branches of a Baobab tree, it shows that rains will not come early that season and so the farmers usually delay their land preparation. But when the nests are shifted to the lower branches, it shows that rains will come early and so land preparation is done early. With the changing climate however, the community members said the birds are confused and so they are confused themselves. The positions of the nests by these birds no longer predicts correctly when the rains will fall. Indigenous knowledge alone may no longer increase adaptive capacity with what we are experiencing now."

- John Ajigo, Nigeria

For more information on the aforementioned case, please see the link in the shared resources below titled "Learning from Experience – Community-based Adaptation to Climate Change in Nigeria". This document explains how indigenous communities in the Bauchi and Jigawa States of Nigeria predict rainfall patterns based on a number of distinct indicators (mostly changes in wind direction and counting down from the last rains of the previous season). It also explains how indigenous knowledge of the participating regions was documented for the case study. Lastly, and even more importantly, it shows how farmers have been helped in predicting rainfalls under increasing climatic variability through the use of simple, modern weather forecasting tools. This provides a neat bridge to the next issue brought up by participants: the role of modern science and climate forecasting.

A vast majority of participants stated that the optimal knowledge system for ASAL communities is one that strikes a balance between indigenous traditions and modern scientific climate forecasting, allowing for smooth integration where possible, rather than one resource dominating the other.

"Indigenous knowledge is an important adaptation measure, though with a rapidly changing climate and increased variability, the traditional natural indicators that constitute the basis of indigenous knowledge may, at times, fail to make accurate predictions under present conditions. Therefore, it is essential to weave the strands of traditional knowledge with that of modern scientific information, so that the success rate of effective implementation is as high as possible."

- Sarah Ahmed, India

Below is an example of what happens when traditional and modern knowledge systems are not integrated.

> *"Maheshkhali Island is situated off the Bay of Bengal coast of Bangladesh. The island has an area of approximately 60 square km. In terms of disasters, cyclones pose the greatest threat to this island. Research revealed that the indigenous prediction capacity possessed by the local people of Maheshkhali has regularly helped them anticipate cyclones and take precautionary measures. It is not uncommon for Maheshkhali islanders to say that they can predict the occurrences of cyclones. However, all of these respondents belong to the older generation (i.e. 50 years and above). For them, the mightiest of cyclones, such as those of 1970 and 1991, are peppered with religious terminology and often referred to as the "Doomsday" or "Curses of God". Their indigenous knowledge, particularly aspects related to natural calamities, is transmitted through the male line and preserved by the older generations. They use five major indicators in predicting cyclones: wind direction, temperature and salinity of seawater, color of clouds, appearance of a rainbow, and the abnormal behavior of certain bird species. As it turns out, indigenous cyclone predictions are even more important than those of the modern system, as revealed during interviews with the Maheskhali islanders, because the locals do not understand the modern warning bulletins' numerical codes (1-10) or its indicators for wind direction."*
>
> *- Syed Amdadul Huq, Bangladesh*

Here, knowledge integration failed because two disaster-forecasting techniques – familiar natural indicators and modern scientific bulletins – were operating in parallel, with the latter using inappropriate messaging to convey modern weather forecasts (i.e. numerical codes), thereby performing at a suboptimal level. When possible, especially in rural ASALs, it is efficient to leverage existing indigenous mechanisms of meteorological understanding to facilitate the adoption of modern climate-related forecasting tools, which, in turn, can increase the uptake of modern scientific methods as well as the effectiveness of traditional systems – a win-win scenario.

> *"Studies undertaken in Zambia document that agricultural practices which embedded both scientific know-how and indigenous knowledge practices were by far superior in providing resilience to droughts and floods. Imported technologies that neglected ecological compatibility only served to provide improved short-term productivity but plunged communities into long-term livelihood hardships as they stripped the environment of its ecological sustainability. It was also found that local people used the phenology of plants and insects to forecast rainfall in the next season".*
>
> *- Monica Chundama, Zambia*

Discussion Topic Five – Key Lessons

- Rural communities have historically forecasted rainfalls, designed planting calendars, and estimated crop productivity based on natural indicators, greatly increasing their resilience to climatic variability
- Amidst climate change, the effectiveness of indigenous knowledge is under threat, meaning understanding the extent to which traditional practices can provide pathways for sustainable adaptation is extremely relevant
- A strategy highlighted by most participants was the complimentary integration of modern climate science with traditional, indigenous knowledge as a means of identifying how to inform historical, on-the-ground experiences with data-driven climate modeling
- When possible, especially in rural ASALs, it is efficient to leverage existing indigenous mechanisms of meteorological understanding to facilitate the adoption of modern climate-related forecasting tools, which, in turn, can increase the uptake of modern scientific methods as well as the effectiveness of traditional systems – a win-win scenario

Supplementary Materials

Participants were provided with the following resources in preparation for Discussion Five:

- Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation (Nakashima et al., 2012)
- Local Forecast Communication in the Altiplano (Gilles and Valdivia, 2009)
- The Role of Indigenous Knowledge in Crafting Adaptation and Mitigation Strategies for Climate Change in Latin America (Kronik and Verner, 2010)
- Linking Knowledge Systems for Rural Livelihoods Adaptation Under Uncertainty: Drying and Warming in Andean Ecosystems (Valdivia et al., 2009)
- Introductory Brief: Indigenous Knowledge in Community-Based Adaptation: Evidence from Latin American Drylands
- Expert Interview with Corinne Valdivia and Jere Gilles: Indigenous Knowledge for Adaptation in the Altiplano (updated 17.10.12)

During the exchange, participants shared additional resources and links to relevant organisations for those interested in exploring this topic further:

- Traditional Food Crops as a Source of Community Resilience in Zimbabwe
- Learning from Experience – Community-based Adaptation to Climate Change in Nigeria

MODULE 2 CONCLUSIONS

This Learning Alliance sought to offer readers a unique set of discussions regarding how climate change is affecting vulnerable communities, what decision makers are trying to do raise resilience, and where opportunities for improvement exist. Thanks to the participation of climate and development specialists from around the world in the online exchange members of the Learning Alliance were provided with insights and examples from professionals working on the current and future impacts of climate change.

Rural communities in ASALs have a long list of priorities that are in constant flux. Successful community-based development projects in ASALs must be comprehensive, integrating near-term community needs (such as livelihood diversification, access to credit, disaster relief and crop insurance) with long-term climatic risks (famine, drought, floods, pests, deforestation and topsoil loss, for example). Leveraging the intrinsic sense of collectivism – a coping mechanism long used by communities to endure arid and semi-arid environs – is an obvious place to start.

As the challenges and vulnerability of climate change loom over rural communities, national governments have a dichotomous role to play: on the one hand, they must incentivise diversification to increase resilience when the adoption of such measures is out of reach of the community (due to such factors as capital costs and geographic isolation); on the other hand, governments must take inventory of antiquated policies and subsidies that provide disincentives to the adoption of those same measures (for example, subsidies for mono-cropping). For example, the increased frequency and intensity of extreme climatic events is undermining some small-scale technologies meaning large-scale infrastructure and policies must be designed to provide safety nets (or even supplant) small-scale systems in the event of widespread failure.

Coping with variable climates is a familiar skill for ASAL communities, which have historically forecasted rainfalls, designed planting calendars, and estimated crop productivity using natural indicators - greatly increasing their resilience to climatic variability. However, amidst climate change, the effectiveness of indigenous knowledge is under threat, meaning understanding the extent to which traditional practices can provide pathways for sustainable future adaptation is extremely relevant. Leverage existing indigenous mechanisms of meteorological understanding can facilitate the adoption of modern climate-related forecasting tools, which, in turn, can increase the uptake of modern scientific methods as well as the effectiveness of traditional systems.

Lastly, the socio-environmental crisis caused by climate change, more often than not, impacts women more severely than men, especially in ASALs. Social programmes are the most effective method to reduce women's vulnerability to climate change, namely by strengthening their CCA skill sets and resources (including programmes to reduce illiteracy and entrepreneurship programmes for livelihood diversification). In many ASAL cultures, women are in charge of household decisions, meaning the above programme benefits targeting women can extend to the entire household.

MODERATORS AND GUEST EXPERTS

Charlotte Heffer (permanent moderator)

Martin Obermaier (permanent moderator)

Daniele Cesano (co-moderator)

Corrine Valdivia (guest expert)

Jere Gilles (guest expert)

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To learn more about discussions on the Learning Alliance on Climate Change Adaptation in Semi-Arid and Arid Regions, contact the author, Jarrod Miles Russell (an ELLA Brazil Project Consultant at Jarrod.m.russell@gmail.com).

FIND OUT MORE FROM ELLA:

To learn more about Latin America's climate adaptation methods in semi-arid regions, read the ELLA Guide, which has a full list of the knowledge materials available on this theme. To learn more about other development issues, browse other ELLA themes.

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