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Cover photo: Inuit family, Greenland © Jim Pire



Hunting on ice - the Arctic

Photo: © James Ford

Adaptation in the Arctic

Barry Smit outlines the effects of a changing climate on Arctic people and describes their adaptation strategies

The small communities dotting the Arctic coastlines are mainly located in wealthy, developed countries. Yet many of the climate change challenges they face are similar to those in developing countries. Arctic people rely on environmental services that are being threatened. Their infrastructure is at risk, their livelihood options are limited, their traditional culture and knowledge are threatened, and there is little institutional capacity to deal with changing sea levels and weather conditions, exposure to sea-level rise and ecosystem disruption.

How vulnerable Arctic residents are to environmental changes associated with the climate is intimately related to local conditions and community sensitivity. These conditions, including livelihoods, economic factors, cultural and social dynamics and infrastructure, greatly influence a community's exposure to climate change and its capac-

ity to adapt. The applied research project CAVIAR (Community Adaptation and Vulnerability in Arctic Regions) is working with local partners to document the exposures, sensitivities and adaptability of communities across the global Arctic, encompassing eight Arctic countries. Employing a 'vulnerability' or 'bottom-up' approach, this research integrates natural sciences and social sciences to provide a comprehensive picture of the

MAIN POINTS

- **The author describes** how Arctic communities are vulnerable to climate change, in particular to changes in ice conditions, sea level, storms and the wildlife on which they depend.
- **He compares the challenges** faced by Arctic and developing country communities.
- **He briefly outlines** an applied research project that is assessing the adaptation needs of Arctic communities.

implications of climate change for Arctic communities in a way that directly relates to adaptation options and policies. The following examples from the Canadian Arctic illustrate some of the key attributes of Arctic communities that relate to vulnerability and influence adaptive strategies.

Reliance on threatened environmental resources

In the high Arctic, societies have evolved to rely on ice. The coastal ocean waters are frozen for half the year so the Inuit people have come to see the ice as an integral part of their resource base. When Inuit go out to hunt, they do not say they are going out "on the ice" they say "on the land". Ice is considered part of their land, because so many of their activities take place on the ice, and so much of their livelihoods and culture depends on it.

With climate change, the behaviour of this ice is changing; the 'land' is changing. The ice



Arctic Bay ice

extends less distance from shore and the ice free season is increasingly longer. In September of 2007, the Northwest Passage through the Arctic waters of Canada was ice free for the first time ever recorded. This trend has led researchers to move up predictions for a completely ice free summer to as soon as 2030. Arctic peoples are facing

new challenges because of their exposure to, and dependence on, ice.

Inuit rely on the ice for transportation to hunt, gather food, generate income, visit family, and all the various reasons we ‘southerners’ rely on roads and highways. The thinning and contraction of the ice are bringing limitations and dangers on

Photo: © Johanna Wandell

movement equivalent to southerners suddenly finding whole sections of roads or highways collapsing.

Climate change can also influence the numbers and location of marine and terrestrial animals important for Inuit diet, income and culture. People are having to adapt their resource management practices, harvesting practices, hunting routes and times and diets. The residents of Tuktoyaktuk traditionally rely on migratory caribou herds as a major source of food. The population of caribou in the region has declined sharply in recent years, forcing the community to expand their diet to include other species as well as store bought foods.

Exposure to sea-level rise

The community of Tuktoyaktuk in the Canadian western Arctic is built on a low-lying archipelago, surrounded by ocean that is frozen for half of the year. Residents of Tuktoyaktuk face the threats of sea-level rise, changes in the frequency and intensity of storms and the loss of coastal protection. As with disappearing coral reefs in Pacific islands, receding ice cover in the Arctic increases exposure to storms and can exacerbate threats to infrastructure, coastlines and communities.

Tuktoyaktuk is dealing with these vulnerabilities by incorporating coastal hazards into their community planning and avoiding putting new buildings close to the

water. Tuktoyaktuk has few other options, so moving the community has become the primary adaptation for which the community has to plan.

Changing permafrost and ice conditions

The community of Arctic Bay on Baffin Island, Nunavut, has a population of nearly 700 people. The livelihoods of this community depend highly on ice conditions and ecological resources. Arctic Bay is also susceptible to changes in permafrost. Traditionally, buildings are fixed into the permanent ground ice, or permafrost, which is as hard as rock. But as the permafrost degrades, those structures become unstable. The main adaptive strategy employed is to change the location of buildings or the type of construction.

Residents of Arctic Bay are also exposed to an increased danger of slope instability and rock fall as a result of thawing permafrost. The community was built between a steep rock slope and the ocean, and many buildings are in the path of falling dislodged rocks and boulders, leaving few suitable places to build. Avoiding this hazard has become a major factor in choosing a location for new buildings.

Threats to traditional knowledge and culture

Hunting is a fundamentally important part of Inuit culture and livelihoods. The Inuit

hunt fish, birds, seals, narwhal, polar bears and caribou, all of which are a source of food as well as income. They travel over the ice to hunt, and hunting takes place primarily at the flow edge, where the land fast ice meets the open ocean. Animals such as whales, narwhal and seals continually re-

turn to the flow edge to breath after feeding on fish under the ice, making this a prime hunting location. But ice conditions have been changing.

In the spring, the ice retreats gradually and huge pieces, supporting the hunters, break off at the flow edge. Hunters report



Shoreline hardening in Tuktoyaktuk in the Canadian western Arctic

Photo: © Mark Andrachuk

that, historically, when ice blocks broke off, prevailing wind patterns would push the pieces against the land fast ice, allowing people to get off. Recently, the wind seems to have changed, often pushing the ice offshore leaving the hunters stranded. Inuit hunters are, therefore, sensitive to changes in wind, but this attribute is not well detailed in global climate models. Ice conditions have also been changing. Formerly safe areas are becoming thin and unstable and cracks in the ice are wider. Traditional routes are proving to be dangerous.

Arctic and other vulnerable communities

The sensitivities of Arctic communities to a changing climate – sea level, storms, safety and access to food and livelihoods – have parallels to sensitivities in many developing countries. Notwithstanding their home in industrialized and wealthy countries, most Arctic communities to date have tended to rely on local, relatively short-term adaptive strategies. As with communities in Bangladesh or small island states, Arctic peoples focus on maintaining their living conditions and livelihoods under changing conditions. This includes economic and cultural changes associated with globalization. Also in common with many developing countries, Arctic peoples must cope with changing environmental conditions that are brought about largely

by the activities of rich, industrialized countries and for which there has been little outside support for adaptation. The commonality between Arctic peoples and small island states is reflected in the Many Strong Voices collaboration outlined at the thirteenth Conference of Parties to the United Nations Framework Convention on Climate Change in Bali, December 2007.

Arctic people would, of course, prefer that climate change was not occurring and that there was more commitment to, and evidence of, greenhouse gas mitigation by rich countries, including their own. At the same time, since stopping or slowing down climate change is clearly a long way off, and since the effects of climate change are already being experienced, these vulnerable communities are already stretching their local adaptive capacities. The need for jurisdictions to assist with adaptation is clear.

The CAVIAR consortium is undertaking, in collaboration with Arctic organizations and local representatives, assessments of vulnerabilities to climate change in case study communities in eight Arctic countries. This applied research aims to identify opportunities and mechanisms for adaptation in each case and to facilitate a comparison of vulnerability insights and adaptation lessons among the communities. ■

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FURTHER INFORMATION

● **On the Web:** To learn more about the CAVIAR project, visit www.cicero.uio.no/projects/detail.aspx?id=30170&lang=EN. Further information about the work of the Global Environmental Change Group can be found at www.uoguelph.ca/~gecg/. Information concerning the Many Strong Voices collaboration is available at www.manystrong-voices.org. The International Polar Year website is at www.IPY.org.

ACKNOWLEDGEMENTS

● This article draws on the research of Tristan Pearce, Mark Andrachuk, James Ford, Johanna Wandel and the residents of communities in the Nunavut and Inuvialuit region. Adam Scott helped prepare this article.

Increasing resilience in Nepal

Dinanath Bhandari and Gehendra Gurung describe community-based adaptation activities to increase resilience to climate change impacts in a watershed in Nepal

Poor communities in different regions of Nepal are vulnerable to climate change-induced hazards such as flash flooding, landslides and drought. Such hazards have been more frequent and of higher magnitude in recent years and all adversely affect community livelihoods. Impacts differ according to altitude, with glacial retreat affecting water availability, and glacial lake outburst floods of particular concern in the high mountains. These affect hydropower generation, irrigation and rural livelihoods. In the middle mountains and at lower altitudes, climate impacts combine with other factors such as a growing human population, the expansion of agriculture onto hill slopes and deforestation to exacerbate flood risks.

In many disasters it is hard to segregate the share that can be attributed to climate change and human activities. Likewise, cli-

mate change impacts can lead to other more dangerous future impacts. For example, where land is damaged by floods, families may need to cultivate land elsewhere. This damages social systems and land use patterns, and adds pressure on this new land, weakening its capacity to withstand future disasters.

MAIN POINTS

- **The authors explain** that many climate change impacts extend throughout the project watershed.
- **They describe** several community-based adaptation activities to strengthen disaster management capacity, improve land management skills and diversify livelihoods. The most important of these is raising community awareness.
- **They conclude** that adaptation is context specific but not unique, and define it as careful development that considers future climatic conditions.

Nepal has little capacity to manage disasters, so community-based adaptation to climate change is the best option for future sustainability. The issue, however, is new for Nepal and the implications of future climate change are hard to predict.

Since October 2004, Practical Action, Nepal, has been implementing a project to increase the resilience of poor communities to climate change impacts. The project is located in the watershed of Jugedi stream and its tributaries, in the Kabilash Village Development Committee in Chitawan District in central Nepal. The region suffers climate change-related disasters such as floods and prolonged droughts. Vulnerable less resilient families are affected most.

The project showed that many impacts, particularly water availability, extended throughout the whole watershed. For example, when a downstream bridge was damaged, people living upstream were also badly

affected because the bridge was their main crossing point for reaching the school, health post, administrative services and market.

Local climate change knowledge

Local communities have been experiencing changes in the climate in recent decades. Summers are hotter and rainfall is more erratic and harder to forecast. Ninety eight per cent of people surveyed had noticed climatic changes, of which 95 per cent felt increasing drought and erratic rainfall were the main indicators. The table below shows some of the impacts described by the local community.

More than 95 per cent of survey respondents felt god was responsible for these changes. Group interactions at the start of the project also suggested that communities felt that population growth and heavy human pressure on natural resources, for example, forest degra-

dation, had caused recent disasters alongside intensive rainfall episodes. Although people had experienced changes in the climate, their understanding of how climate change affects ecosystems and peoples' lives was lacking.

Community-based adaptation activities

Practical Action has been working with poor rural communities in the region to strengthen their capacity to manage disasters, improve their land management skills and diversify their livelihoods to make them more resilient to climate change impacts. Communities participated throughout all stages of the project. When helped to identify and prioritize their vulnerabilities to climate change, flood and drought emerged as the most important issues. Coping strategies and options were jointly identified based on their relevance to family

livelihoods. The following activities were implemented.

Raising awareness on climate change. Since community awareness on climate change and its impacts was very low, raising awareness was of foremost importance. Current and projected climate change trends and impacts were shared with school students, teachers, the community, policy makers and other stakeholders. Although difficult to quantify, community awareness levels grew. The community, its development partners and policy makers also realized the need for improved preparedness for future chaotic situations.

Improving traditional irrigation systems. Because of erratic rainfall and extreme weather events, flash floods have been more frequent and of larger magnitude in recent years. Water availability has fallen because groundwater recharge is lower as a result of rainfall being confined to a few days during the monsoon season leaving the rest of the year almost dry. The project repaired irrigation systems damaged by the floods, thus compensating for reduced groundwater availability. Improvements prevented water loss due to seepage.

Off-season cash crop planting. Erratic rainfall has reduced cereal production and threatened food security. To combat this, off-season cash crops have been grown. These produce good yields and need little irrigation. Income generated has allowed farmers to purchase grain and has provided employment for people marketing these crops. With these efforts the loss of cereal crops has been recovered and sometimes

CLIMATE CHANGE IMPACTS IN THE PROJECT AREA

- Loss of land, houses, livestock, human life and physical infrastructure
- Changes in production and, hence, food security
- Hotter summers and warmer shorter winters
- Weather extremes like cold waves during winter and hot waves during summer
- Increasing frequency of flash floods
- Changing plant habits like early blooming

there has been extra income to improve livelihoods and educate children.

Improved land management and forest conservation. Floods were exacerbated by a combination of climate change and natural resource degradation. Project interventions, therefore, also concentrated on improving the state of natural resources, particularly forests. Interventions were conducted through existing community forest groups, which are registered at the district forest office according to national forest legislation. Orientation training, exposure visits, workshops and meetings were organized. Support for plantations and restoring degraded land was provided and controlling grazing and browsing has promoted natural forest regeneration. The illegal felling of trees has stopped.

Other inputs include technologies such as terracing and tree planting for agriculture on sloping land, stall feeding, tree and grass fodder production, improving livestock breeds and microcatchment improvement using vegetation and gabion check dams.

Diversifying sources of income and livelihoods. The project promoted additional employment opportunities like dairy and vegetable marketing, and provided weekly orientation sessions on farming and vegetable production for a year. Vegetable production has increased by a factor of 500 and farmers now regularly supply vegetables and milk to local markets and further afield. The employment and income generated from this has substituted for the loss of grain production due to erratic rainfall and thereby

increased farmer resilience. Project inputs will continue until farmers have the confidence to conduct these activities self-sufficiently.

Long rotation crops, like fruits, that are more resilient to erratic rainfall were introduced. Farmers who planted bananas now sell their products at the local markets. Planting both long and short rotation crops has helped farmers fulfil long- and short-term needs. Farmers have also been able to use vertical space and temporal gaps through intercropping. Increasing agricultural biodiversity has proved to be a key livelihood strategy for coping with changing and more challenging environmental conditions.

Integrated watershed management. As a short-term response to floods, farmers were given materials and technical help to lay gabion dykes and spurs along stream banks to protect their land and houses from small-scale disasters. For long-term solutions, an integrated watershed management approach was applied, under which proper management of land, forests, livestock, water sources and community practices took place. Communities prepared a long-term disaster preparedness and integrated watershed management plan with project support. This considered future climate change impacts.



Tapstand gravity-fed water supply network in Basti village, Nepal

Photo: © Martijn van de Rijdt/EC/ECHO

Community-based weather monitoring. To understand changes in local weather patterns, a simple village weather station was established. This provides information on daily minimum and maximum temperatures, rainfall and humidity. The data will help the community understand how local weather patterns are changing over time. In a few years, communities will be able to draw concrete conclusions regarding the changing climate.

Improved disaster preparedness. A newly developed five-year disaster preparedness plan has identified a range of immediate and long-term interventions for adaptation to climate change and risk reduction in the area. Community-based organizations will implement this plan with external support from local government, non-government organizations and other funding agencies.

Institutional set up

All households within the watershed have been organized into a community-based organization, which has been registered at the district administration office. With the help of the project, the organization has prepared and implemented its constitution under the current national act. This gives the community a legal basis for getting external support and coordinating with other stakeholders within and outside the district. The organization is part of the district-level disaster preparedness network, which will enable it to build links with other institutions and organize resources. Establishing this organization en-

sures the sustainability of project activities because it can continue with activities in the future, build its own skills and link to local government and other service providers.

Conclusions

Interventions from Practical Action have linked environmental phenomena with community experiences. Participatory analysis of the causes of problems and the solutions that the community could implement occurred. Short- and long-term strategies for coping with climate change impacts were identified and implemented.

Many climate change impacts, especially those related to precipitation, extend throughout the watershed. Impacts have implications both upstream and downstream within the watershed, and one impact can lead to another impact, which may affect other livelihood assets.

Adaptation measures are not unique but they are context specific. They depend on the impacts themselves and the vulnerabilities, resilience and power to cope with the impacts of the people affected. Adaptation is careful development taking future climatic conditions into consideration.

Raising community awareness is of foremost importance when adapting to a changing climate. Big initiatives may be needed depending on the magnitude of impacts, but even small activities on the ground can contribute a great deal to coping with adverse climate change impacts. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary maintains a listing of websites on mountains and climate change at www.tiempocyberclimate.org/portal/t4445web.htm.

● **On the Web:** The Practical Action, Nepal, website can be found at www.practicalaction.org.

Community action in Nepal

Bimal Regmi and his co-authors describe three community-based adaptation activities used to combat climate change impacts on agriculture in Nepal

Any affect that climate change has on agriculture will affect the livelihoods of most Nepalese people and increase the risk of food insecurity. This in turn could increase food prices and affect the entire economic wellbeing of Nepal. Declining food production could increase malnutrition and have huge consequences, particularly for children. Climate change is already adding to problems such as trade, population growth, deforestation and desertification, which already threaten food security in Nepal.

Some 80 percent of Nepalese people follow traditional cultivation practices and depend on agriculture for their livelihoods. These practices rely on rainwater and the seasons. Many mountain dwellers have observed unusually erratic heavy monsoon rains in recent years. Farmers have noticed delays in the monsoon season, changes in rainfall intensity and duration, reduced productivity,

changing vegetation composition and more soil erosion. With less rainfall, rivers and springs have dried up.

Extreme events like excessive rainfall, longer drought periods, landslides and floods are increasing in magnitude and frequency. More floods and glacial lake outbursts are expected to destroy irrigation and water supply systems, roads, bridges, settlements

MAIN POINTS

- **The authors describe** three community-based adaptation activities used to combat climate change impacts on agriculture in Nepal.
- **Efforts are limited** but participatory plant breeding, increasing access to plant genetic re-

sources and planting hedgerows have been promoted in places.

- **The authors call for** more proactive mainstreaming of climate change considerations into policy making and greater incorporation of local knowledge into adaptation strategizing.

and productive land. Land degradation will reduce crop productivity and put more pressure on remaining fertile land. In the dry season, increased evaporation will lead to water scarcity. Soil moisture deficits, droughts, fire and possible pest outbreaks will decrease crop yields.

Delays to the monsoon season in the past three years have affected rotational cropping systems and, along with less rainfall, have left thousands of hectares of farmland fallow. This has reduced production. Due to the late arrival of monsoon rains and reduced rainfall, farmers in the Tanahun District can no longer depend on rain-fed paddy cultivation and have been forced to cope with potential food shortages by increasing unsustainable 'slash and burn' activities. Studies in the Kaski District in the past three years show that as rainfall has decreased, rice and wheat production have gone down while maize production has increased a little. Farmers in

Bardiya and Kanchanpur Districts link the loss of local seed varieties to climate change. Local varieties require longer rainy seasons so, as the rainy season has shortened, farmers have turned to hybrid varieties to increase yields.

Communities in Nepal have been involved in various activities to combat climate change impacts. Three are described here.

Participatory plant breeding to develop drought-resistant rice

Begnas Village in Western Nepal used to be well known for its richness of local rice varieties, many of which were drought resistant. Due to modernization and the introduction of improved varieties, farmers have slowly moved towards using a few high yielding varieties but these are no longer suited to the local microclimate and need plenty of fertilizer. Yields have gradually decreased and disease and pest outbreaks have occurred. In addition, these varieties grew badly under the conditions of severe drought, unpredictable rainfall and hailstones increasingly observed in Begnas Village.

The miserable farmers approached Local Initiatives for Biodiversity, Research and Development (LI-BIRD) for help. Farmers realized that local varieties had characteristics that, with improvement, could better cope with adverse climatic impacts and other problems. LI-BIRD, along with the National Agriculture Research Council and Biodiversity International, thus began a project us-

ing participatory plant breeding to improve the quality and traits of local varieties. The project promoted on-farm conservation of genetic resources through community empowerment.

Initially, an inventory of 69 local rice varieties was made at a community seed bank. Farmers then selected eight varieties with beneficial traits such as the ability to cope with low rainfall or long droughts. For example, the



Children in Banva village, Nepal

Photo: © Martijn van de Rijdt/EC/ECHO

MANSARA variety was selected because of its drought tolerance, early ripening, good yield, low need for fertilizer and ability to cope with a delayed monsoon. MANSARA, however, has low productivity and poor taste. Participatory plant breeding on MANSARA aimed to retain its positive characteristics whilst replacing its negative ones. Farmers selected KHUMAL-4 for crossbreeding with MANSARA in the hope that useful characteristics from KHUMAL-4 could replace some of MANSARA's negative traits.

Farmers were involved throughout the breeding programme, for example, in plant selection after each generation of crossbred plants was produced, rice taste tests and milling recovery tests to assess how much rice would be recovered after each harvest. After nine generations, a new variety called MANSARA-5 emerged, which was well adapted to the local microclimate.

Today, the villagers are continuing with participatory plant breeding activities. They are documenting local climate change impacts and have recently initiated a community seed bank to conserve the gene pool of local varieties. This could help Begnas farmers combat future climate change impacts.

Increasing access to local plant genetic resources for the poor

In Kachorwa in the Bara District of Nepal, communities have established a seed bank with the help of a community-based organization to help ensure that poor farmers can access local genetic resources. Community

members were trained to grow useful local cultivars. They tested consistency in naming and the incidence of pests and diseases. Seeds were packed in small bags or envelopes and distributed or sold to farmers to encourage them to select, maintain and exchange materials through their own social networks. This practice was very effective at improving access to materials and knowledge, and at conserving traditional local varieties. The table below shows that poor vulnerable households accessed the seed bank much more than rich people.

The project demonstrates one way in which communities have adapted to cope with the impact of extreme climatic stresses. It ensures access to genetic resources for the sustained

production of food and conserves local varieties from genetic erosion.

Adaptation technologies for reducing community vulnerability

Shifting cultivation is still an important land use system for some ethnic groups in Nepal. The system involves clearing a piece of land and growing trees or crops on it until the soil loses fertility and productivity falls. The land is then left and reclaimed by natural vegetation or used for other farming practices. Shifting cultivation is at risk from flooding, soil erosion, landslides and other forms of land degradation resulting from heavy monsoon rains.

With financial support from the Hill Agriculture Research Project, LI-BIRD designed

HOUSEHOLDS ACCESSING SEED BANK

Year	Number (and percentage) of farmers from different socioeconomic categories accessing the seed bank			Number of seed varieties accessed	Seed quantity accessed (kilograms)
	Rich	Medium	Poor		
2003	5 (12%)	19 (48%)	16 (40%)	11	87
2004	6 (17%)	14 (40%)	15 (43%)	13	69
2005	17 (20%)	37 (42%)	33 (38%)	23	197

and implemented a project to introduce hedgerows in areas where shifting cultivation occurred, such as the villages of Kholagaun and Rasauli in the Tanhun Districts. The project helped some of the poorest and most

“planting hedgerows in the project areas helped stabilize the soil and thus enhance food production and income”

vulnerable communities in Nepal, known as Chepang, to develop strategies to cope with adverse climate change impacts and improve their livelihoods by reducing their vulnerability. It demonstrates a community-based adaptation technology suitable for shifting cultivation areas on sloping land in Nepal.

Planting hedgerows in the project areas helped stabilize the soil and thus enhance food production and income. Soil quality improved markedly in project areas and many of the plots with hedgerows are being transformed into terraces. Soil erosion has decreased by 40 per cent in the past four years of the project. The technology has also reduced the workload of women who collect fodder by 30 per cent and has helped other poor and marginalized communities generate income. Such conservation farming practices are gradually replacing traditional slash and burn practices, thus reducing the burning of forested areas.

Conclusions

Climate change poses a major threat to Himalayan biodiversity. Habitat loss due to massive changes in landscape use is also eroding genetic resources and agricultural biodiver-

sity at an alarming rate. Farmers are already suffering from these changes. The impacts are most severe for poor and marginalized communities who depend solely on natural resources for their livelihoods.

This article describes three innovative adaptation practices that have been promoted in the field. Efforts, however, are limited and scattered. There is still a need for a practical and proactive approach to mainstreaming climate change considerations into both community-based and national level policies. Greater effort is also needed to consider local knowledge and practices when developing adaptation strategies. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** See the *Tiempo* special edition on Nepal at www.tiemposcyberclimate.org/portal/archive/pdf/tiempo60low.pdf.

EXTREME WEATHER

Nearly one million people in southern Africa have been affected by floods, cyclones and heavy rains since October 2007.

Madagascar has been hardest hit, with almost a third of a million people suffering the consequences of a series of extreme events. The World Meteorological Organization (WMO) has called for more investment in weather forecasting in Africa, Central Asia and small island states.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080406.htm

ASSUMPTIONS

The Intergovernmental Panel on Climate Change has been overly optimistic in assuming that, without intervention, new technologies will reduce growth in greenhouse gas emissions, according to a commentary in the journal Nature.

"Not only is this reduction unlikely to happen under current policies, we are moving in the opposite direction right now. We believe these kind of assumptions in the analysis blind us to reality and could potentially distort our ability to develop effective policies," said report co-author, Roger Pielke Jr of the University of Colorado.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080420.htm

FOOD PRICES

Jacques Diouf, director general of the United Nations Food and Agriculture Organization, has warned that world food prices are set to remain high for some time.

"The problem is very serious around the world due to severe price rises and we have seen riots in Egypt, Cameroon, Haiti and Burkina Faso," he said. "There is a risk that this unrest will spread in countries where 50 to 60 per cent of income goes to food." Food prices have risen as a result of increasing oil and fuel prices, rising demand for food in Asia, conversion of cropland for biofuels, poor weather and speculation on futures markets.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080420.htm

ENERGY

The countries of the Asia-Pacific region could save US\$700 billion by 2030 through greater use of energy conservation and renewable energy, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) predicts.

"Heavy dependency on fossil fuels is aggravating the Asia-Pacific region's economic vulnerability," Noeleen Heyzer of ESCAP told a ministerial summit. Without energy management reform, the poor would be increasingly unable to afford energy, she warned.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080511.htm

CHILDREN

The world's poorest children are among the main victims of climate change, according to a new report from the United Nations Children's Fund (UNICEF).

"It is clear that a failure to address climate change is a failure to protect children," said David Bull from UNICEF United Kingdom. "Those who have contributed least to climate change - the world's poorest children - are suffering the most." The report's authors estimate that global warming could be responsible for 40,000 to 160,000 child deaths a year in Asia and sub-Saharan Africa as economic growth is affected.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080511.htm

Teafarming in South Africa

Adéle Arendse and Rosa Blaauw describe a community-based adaptation project helping rooibos tea farmers in South Africa adapt to local climatic changes

The winter rainfall areas on the west coast and adjacent inland areas of South Africa are home to two unique biomes of global significance: the Cape Fynbos, which is the smallest of the world's floristic kingdoms and is spectacularly diverse, and the Succulent Karoo, which is the world's most diverse desert biome. Both are internationally recognized biodiversity 'hotspots' and host a vast array of drought-tolerant plants, well adapted to summer drought and light winter rains.

The Suid Bokkeveld is part of the northernmost extreme of the Fynbos biome, and is home to many endemic plants, including a locally adapted sub-species of *Aspalathus linearis*, known locally as rooibos. Rooibos is used to make a herbal tea that is increasingly popular in local and international markets. It is naturally restricted to the northwestern region of the Fynbos biome, and only grows

in South Africa. A particularly long-lived and drought- and fire-resistant variety of *Aspalathus linearis* occurs naturally in the area and the tea it produces has been valued medicinally and culturally since pre-colonial times.

Climatic change impacts

The Suid Bokkeveld experienced severe drought between 2003 and 2006. Later onset of autumn rains during the critical rainfall season, a decrease in average annual rain-

MAIN POINTS

- **Rooibos is cultivated** in dry areas along the western interior of South Africa to make a herbal tea.

- **Climate change is likely** to make rooibos growing areas warmer, dryer and less hospitable for

- cultivation, with subsequent impacts on the livelihoods of small-scale rooibos tea farmers.

- **The authors describe** a project aiming to help farmers adapt to predicted climatic changes.

fall and unusually mild temperatures during winter led to drought conditions during the hot, dry summers. In 2003, all significant winter rains fell in one dramatic event during August, with little rainfall before or after this event, making preparing the land and allowing crop establishment after planting difficult. The low humidity associated with the drought contributed to unusually low overnight temperatures in the winter of 2003. Rooibos crops died of black frost in the northern parts of the Suid Bokkeveld. Combined with the summer drought that followed, small-scale farmers of the Heiveld Co-operative suffered yield losses of 40 to 100 per cent.

Future climate change scenarios for the area indicate the possibility of increased variability of precipitation, and a possible 20 per cent increase in the length of dry spells with delays in the onset of the winter rainfall season. The number of rain days per year could

decrease with likely reductions in average annual precipitation. More warming and drying and increases in wind velocity are likely.

The increased aridity projected by most climate models will severely affect many species in the Succulent Karoo and Fynbos biomes. Only the hardiest plants of the Succulent Karoo biome will be able to survive. The ability of rain-fed crops, such as commercially harvested rooibos tea, to survive will be greatly reduced.

Farming activities in the Suid Bokkeveld are inextricably linked to rainfall patterns. Changes in the amount, distribution and onset of rainfall beyond the conventional range of variability hold serious implications for rooibos production management and thus, the livelihoods of small-scale farming communities in the area. The table below describes some of the direct and indirect im-

pacts of climate change in the Suid Bokkeveld already identified by the small-scale farmers.

Social, political and economic context

No villages exist in the Suid Bokkeveld, although a number of small settlements occur. ‘Coloured’ farm workers and their families work seasonally or permanently as labourers and domestic workers on mostly white-owned farms. Most small-scale farmers work for between one and six months tending their own crops and livestock on land that they own or, more commonly, lease. The rest of their time is spent labouring seasonally on neighbouring farms or further away.

Small-scale farmers have historically been marginalized socially, economically and politically. Despite the political changes in post-

Apartheid South Africa, their situation has not greatly changed. Land tenure amongst small-scale farmers in the Suid Bokkeveld remains highly variable, despite well-formulated government land redistribution policies. A system of social arrangements exists amongst landowners, managers and harvesters around access to and control of natural resources.

Most small-scale farms are situated in the southernmost parts of the Suid Bokkeveld region. Rooibos tea production is a primary source of income for these small growers. This includes both the cultivated ‘Nortier’ variety and the wild variety. The prolonged drought conditions from 2003 to 2006 resulted in dramatic declines in agricultural production, mortality of crops and livestock and the drying up of most water sources, which severely affected the livelihoods of these small-scale farmers and their households. The area has limited arable land and small-scale farmers have very few alternatives to low-input subsistence and crop farming.

The anticipated adverse effects of climate change will add to existing economic pressures affecting farmers in the area. Opportunities for small-scale farmers to engage in environmental monitoring and climate adaptation activities in partnership with scientists, non-government organizations, local authorities and conservation agencies are an essential part of transforming their role and enabling them to become more influential and environmentally responsible actors.

DIRECT AND INDIRECT IMPACTS OF CLIMATE CHANGE

Direct impacts

- Increasing variability in the onset and duration of winter rainfall
- Effects on cultivated and wild rooibos production
- Greater variability in the precipitation regimes associated with different seasons
- A notable decrease in average annual rainfall
- Drying up of perennial and other important water sources
- Increases in the numbers of pests and pathogens and changes in their timing affecting crops and livestock
- Increased risk of uncontrolled fires

Indirect impacts

- Worse condition of dirt roads, thus affecting transport
- Pressure to manage quality control and machine maintenance costs for rooibos production
- Limited availability of external employment opportunities

The Heiveld Co-operative is an organization of small growers from the Suid Bokkeveld formed in 2001 to produce cultivated and wild harvested rooibos tea for niche fairtrade and organic markets overseas. Research by members of the Heiveld Co-operative, the University of Cape Town, Indigo development and change and the Environmental Monitoring Group has identified harvesting practices for wild stands of the endemic sub-species of *Aspalathus linearis* that are more likely to result in survival of the plant and sustained production. Farmers produc-

ing wild rooibos that has been harvested in a sustainable manner receive a premium price for their product. By developing fairtrade and 'greener' production practices, the producer organizations and their members have been able to secure a small but significant market share.

Local adaptation activities

During the past two years, some Suid Bokkeveld farmers have participated in a pilot action research project that has shared climate science information and predictions

and farmers' own experiences of weather events and impacts. This project stimulated debate and action amongst farmers relating to climate change adaptation. For example, some have been monitoring the impact of changing rainfall on the growth of rooibos plants.

The Heiveld Co-operative has initiated a Global Environment Facility Small Grants project to support capacity development and help farmers undertake soil and water conservation actions that would otherwise be beyond their means. Heiveld Co-operative members have also contributed valuable local knowledge that had, until then, been largely undocumented.

Community-based efforts to reduce soil degradation, enhance soil carbon and re-establish field floral biodiversity by establishing windbreaks made from indigenous plants have shown promising initial results. However, not all farmers have adopted these techniques and many still use clearing and cultivation methods that are not environmentally friendly or sustainable in the long-term. Lessons learned from these approaches have been shared with policy makers at national and provincial levels.

A new project

Building on these experiences and other previous participatory research, a new project aims to 'scale up and scale out' the approaches that have been successful or have shown promise. Funding from the Global En-



Rural residents prepare a vegetable garden, Port St Johns, South Africa

Photo: © Trevor Samson/World Bank

vironment Facility Small Grants Programme in South Africa has been awarded, and the project will be managed by a partnership between SouthSouthNorth-Africa and Indigo development and change, with participation from the University of Cape Town and the Environmental Monitoring Group.

The SouthSouthNorth Adaptation Project Protocol methodology identifies the Suid Bokkeveld rooibos producing community as being located in a 'hotspot' in terms of poverty and climate change vulnerability. The project aims to help these small-scale farmers adapt their farming practices to anticipated climate change and ensure that sustainable resource use occurs. This will be done by raising local farmers' awareness about climate change and exploring the viability of cultivating wild rooibos as an adaptation strategy. Farmers will monitor local climate data by establishing basic weather stations. Quarterly climate-preparedness workshops will raise awareness of, and help develop, local adaptation strategies. Wild rooibos germination trials in greenhouses and then on farmland will occur. Monitoring and evaluation will be participatory and continuous throughout the project. Lessons learned from the project area will be shared elsewhere.

In South Africa, women are often the hidden participants in farming livelihoods and many official interventions fail to recognize this. Women are amongst the most vulnerable land users so the project will create specific activities to address their needs.

An integrated approach will aim to allow women to voice their specific concerns and constraints regarding climate change and the impacts this will have on them, hence allowing more nuanced development of adaptation strategies.

Challenges

South African government policy for supporting adaptation is poorly developed, and not grounded in existing adaptation knowledge and strategies. Many incentives are designed to stimulate economic growth, often in unsustainable ways and with negative impacts on natural resources. Response to drought is driven by short-term political goals, and relief provided tends to exacerbate the problem in the long-term without building the human or economic capacities needed to adapt agriculture to a warmer, drier world.

Most scientists in South Africa work within the narrow bounds of their disciplines and lack the conceptual skills and tools to transcend the boundaries of their areas of expertise. To this end, a participatory action research approach will engage land users and scientists in action learning within the project. Scientific and experiential data relating to climatic events and impacts, as well as long-range forecasts, will be shared and analysed by team members and by farmers in order to develop and support further practical adaptation measures by farmers, other resource users and government agencies. ■

ABOUT THE AUTHORS



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● **Rosa Blaauw** is Project Officer for the SouthSouth-North Adaptation to Climate Change Programme in South Africa.

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FURTHER INFORMATION

● **On the Web:** Visit www.southsouthnorth.org for more information about the community-based rooibos tea farming project, www.heiveld.co.za for more information on the Heiveld Co-operative, www.emg.co.za to read about the Environmental Monitoring Group's work with small-scale rooibos tea farmers, and www.indigo-dc.org for information on Indigo development and change and their role in the project.



CONFERENCES

EVENTS**33rd Geoscience World Congress on Earth System Science: Foundation for Sustainable Development****Oslo, Norway:****06-08-2008 to 14-08-2008**

Jointly organized by the International Union of Geological Sciences and the National Committees of Norway, Denmark, Finland, Iceland and Sweden. Programme will include a GeoExpo exhibition, poster awards and a number of regional excursions. Workshops and seminars will cover issues regarding the major geoscience programmes, interdisciplinary symposia and special regional symposia.

Details: Asgeir Knudsen, *Congress Conference, P.O. Box 2694, Solli, Oslo 0204, Norway.*

Fax: +47-22560541

Email: secretariat@33igc.org

Web: www.33igc.org/coco

2008 ACEEE Summer Study on Energy Efficiency in Buildings**California, USA:****17-08-2008 to 22-08-2008**

Working theme of the 2008 study course is "Scaling Up: Building Tomorrow's Solutions". Main panel areas of work will include: residential buildings and design, technologies and trends; commercial buildings and design, evaluation, implementation and trends; strategies for appliances, lighting and electronics; energy and environmental policies; sustainable communities; and new ideas for energy efficiency.

Details: Rebecca Lunetta, *ACEEE Summer Study Office, P.O. Box 7588, Newark,*

DE 19714-7588, USA.

Fax: +1-302-2923965

Email: r.lunetta@verizon.net

Web: www.aceee.org

Climate Change & Business Conference 2008**Auckland, New Zealand:****18-08-2008 to 20-08-2008**

The 4th annual Australia-New Zealand Conference. Focus will be on risks and opportunities facing business resulting from climate change with an emphasis on emissions trading. Discussion sessions include risk management, voluntary carbon markets and other markets. There will also be a number of specialized workshops with advice on business opportunities available to specific sectors.

Details: Fiona Driver, *Climate Change and Business Centre, P.O. Box 95152, Swanson, Waitakere City 0653, New Zealand.*

Fax: +64-9-3601242

Email: f.driver@climateandbusiness.com

Web: www.climateandbusiness.com

2nd International Sustainability Conference: Creating Values for Sustainable Development**Basel, Switzerland:****21-08-2008 to 22-08-2008**

Intends to bring together water and climate scientists from a broad range of sectors to discuss and share knowledge and expertise in order to improve understanding of the impact of climate and development on groundwater resources in Africa.

Details: Yvonne Scherrer, *Conference Coordinator, University of Basel, Program Sustainability Research, Klingbergstrasse 50, CH-4056 Basel, Switzerland.*

Email: isc@unibas.ch

Web: www.isc2008.ch

International Conference on Adaptation of Forests & Forest Management to Changing Climate with Emphasis on Forest Health**Umea, Sweden:****25-08-2008 to 28-08-2008**

Sub-title of the conference is "A review of science, policies and practices". Co-organized by the Food and Agriculture Organization, the Swedish University of Agricultural Sciences and the International Union of Forest Research Organizations (IUFRO). Conference will focus on the current state of knowledge of ongoing changes in climatic conditions in different regions of the world.

Details: Alexander Buck, *IUFRO Secretariat, Mariabrunn (BFW), Hauptstrasse 7, A-1140 Vienna, Austria.*

Fax: +43-1-877015150

Email: buck@iufro.org

Web: www.iufro.org

13th World Water Congress**Montpellier, France:****25-08-2008 to 28-08-2008**

Aim of the Congress is to enhance international awareness and knowledge of the impact of global changes on water resources. Working theme is "Confronting the expanding and diversifying pressures". Will include debates, open dialogue sessions, presentations and exhibitions. Topics include: climate change and disasters; water availability and use and management; governance and security; capacity building; and development of infrastructure.

Details: Water Congress Organizer, *Domaine de Lavalette, 859 rue Jean-Francois Breton, 34093 Montpellier, France.*

Fax: +33-4-67522829

Email: wwc2008@msem.univ-montp2.fr

Web: www.wwc2008.msem.univ-montp2.fr

International Conference on Coastal Engineering (ICCE2008)**Hamburg, Germany:****31-08-2008 to 05-09-2008**

Conference will focus on the theory, measurement, modelling and practice involved in coastal engineering. It is intended that there will be presentations of practical papers detailing design, construction and performance of case study coastal projects. Topics include coastal processes, ports, harbours and waterways, coastal risks, coastal development and the coastal environment.

Details: ICCE2008 Secretariat, *Holger Schuttrumpf, Bundesanstalt für Wasserbau (BAW), Wedeler Landstasse 157, 22559 Hamburg, Germany.*

Fax: +49-40-81908373

Email: schuttrumpf@hamburg.baw.de

Web: www.icce2008.hamburg.baw.de

BioEnergy Americas**Buenos Aires, Argentina:****09-09-2008 to 10-09-2008**

This event will feature high-level de-

bate, discussion and analysis from a selection of leading players in government, industry and others involved in the region's biodiesel market. This year the event will include discussion and debate on biofuels, biomass and biopower generation.

Details: Conference Organizer, Greenpower Conferences, Shakespeare House, 168 Lavendar Hill, London SW11 5TF, UK.

Fax: +44-20-79001853

Email: info@greenpowerconferences.com

Web: www.greenpowerconferences.com/biofuelsmarkets/bioenergy_americas.html

Waste 2008

Warwick, UK:

16-09-2008 to 17-09-2008

Working theme of the conference is "Waste and Resource Management: a Shared Responsibility". Innovation and research contributing to the implementation of this strategy will be the focus. Broad range of topics include: encouraging waste prevention; development of waste management policies; integrated waste management; encouraging resource recovery; and emerging technologies.

Details: Waste 2008 Conference Office, Attenborough House, Browns Lane Business Park, Stanton-on-the-Wolds, Nottingham NG12 5BL, UK.

Fax: +44-115-9371100

Email: info@waste2008.com

Web: www.waste2008.com

5th International Conference on Land Degradation

Bari, Italy:

18-09-2008 to 22-09-2008

Working theme of the conference is "Moving ahead from assessments to actions: Could we win the struggle with land degradation?" Focus will be on examples showing that when local people are the authors and actors of the development process it is possible to make real change in reversing the trend to land degradation. Key words and phrases in discussion topics are: multidisciplinary assessment; interaction; participatory management; and impacts of mismanagement.

Details: Pandi Zdruli, CIHEAM-Istituto Agronomico Mediterraneo, Via Ceglie 9, 700010 Valenzano, Bari, Italy.

Fax: +39-80-4606244

Email: pandi@iamb.it

Web: www.iamb.it/5ICLD

4th International Conference on Biomass for Energy

Kiev, Ukraine:

22-09-2008 to 24-09-2008

Conference is dedicated to the 90th anniversary of the National Academy of Sciences of Ukraine. Working languages will be Ukrainian, Russian and English. Main topics include: biomass resources and its pretreatment; strategy and policy issues; economic and environmental issues of bioenergy technology; research and development of bioenergy technologies; and demonstrations of biomass-to-energy. **Details:** Tetyana Zhelyezna, Institute of

Engineering Thermophysics, NAS of Ukraine, 2a Zhelyabov Str., 03057 Kiev, Ukraine.

Fax: +38-44-4566091

Email: conference@biomass.kiev.ua

Web: www.biomass.kiev.ua/conf2008

Carbon Markets India

Mumbai, India:

29-09-2008 to 30-09-2008

Working theme is "Migrating business to a low carbon economy for sustainable economic growth". Panel discussions and themes will include: business incentives for reducing carbon footprints; greener production; trading and pricing Certified Emissions Reductions in India; new market developments; Clean Development Mechanism (CDM) as an additional revenue source for industry; and an update on the Indian CDM market.

Details: Conference Organizer, Greenpower Conferences, Shakespeare House, 168 Lavendar Hill, London SW11 5TF, UK.

Fax: +44-20-79001853

Email: info@greenpowerconferences.com

Web: www.greenpowerconferences.com/carbonmarkets/carbonmarkets_india_2008.html

Sustainable Cities & Communities

Geneva, Switzerland:

30-09-2008 to 01-10-2008

This will be an inaugural conference jointly organized by WWF's One Planet Living and Greenpower Conferences. Intended to be a high-power

event aimed at architects, urban planners, mayors, financiers and sustainability professionals. Discussion will focus on cutting-edge campaigns, regulations and possibilities for cities and communities. A 2-day pre-conference workshop will cover the launch of WWF's global "One Planet" initiative.

Details: Conference Organizer, Greenpower Conferences, Shakespeare House, 168 Lavendar Hill, London SW11 5TF, UK.

Fax: +44-20-79001853

Email: info@greenpowerconferences.com

Web: www.greenpowerconferences.com

Voluntary Carbon Markets

London, UK:

14-10-2008 to 15-10-2008

Sponsored by Eco Securities and First Climate. The third forum in a global series, this event will emphasize integrated solutions of brand positioning, business development and opportunities for face-to-face networking with senior decision makers.

Details: Santosh Sarma, Greenpower Conferences, Shakespeare House, 168 Lavendar Hill, London SW11 5TF, UK.

Fax: +44-2079001853

Email: santosh.sarma@greenpowerconferences.com

Web: www.greenpowerconferences.com/carbonmarkets/vcm_2008.html

Adaptation in South Asia

Rachel Berger and Mohammad Ali describe a proposal to scale up community-based adaptation activities in Bangladesh using experiences from South Asia

In Bangladesh, the international non-government organization (NGO) Practical Action is conducting several community-based adaptation projects, which have been selected with community input. Floating vegetable gardens allow for seedlings to be grown when land is flooded, so that they are ready to plant out when the floodwater recedes. Fish are reared in cages, which are anchored in ponds created by monsoon rains when the river is too fast flowing for fishing boats to go out. A variety of rice has been planted that matures before the monsoon rains, and ponds are used for rearing ducks and fish. Ducks provide eggs for the market and are more resilient to floods than chickens.

These activities have been conducted under Practical Action's Strengthening Resilience of Communities to Cope with Climate Change project. This project has three objectives: (1) to strengthen the capacity of

communities and supporting institutions to prepare and respond effectively to climate induced emergencies; (2) to develop and promote practical interventions to strengthen people's livelihoods and natural resource assets; and, (3) to promote engagement of vulnerable communities in decision making processes on climate change adaptation

MAIN POINTS

- **The authors describe** community-based adaptation activities in Bangladesh conducted by Practical Action under its Strengthening Resilience of Communities to Cope with Climate Change project.
- **Project activities provide** knowledge on how to help poor
- communities cope with climate change and have also influenced international policy processes.
- **The authors conclude** with a proposal for scaling up community-based adaptation activities in Bangladesh over the coming years.

strategies. The project was designed to run from 2004 to 2007 in four South Asian countries: Bangladesh, Nepal, Sri Lanka and Pakistan. It was funded using £400,000 from the Allachy Trust in the United Kingdom.

The project was designed using experience gained from helping communities adapt to climate change under several programmes operating over the past ten years in Asia. These include a livelihoods-based approach to disaster risk reduction in five Asian countries, programmes for disaster preparedness planning in Nepal, Sri Lanka and Bangladesh, programmes to strengthen food security and food production in Bangladesh and research on consensus building to strengthen livelihoods, also in Bangladesh.

The project used Practical Action's extensive experience with community-based development to take a very practical approach to community-based adaptation. It undertook the following processes and activities:

- explaining to local communities what is happening to the climate and why;
- finding out how communities cope with and adjust their lives in the face of climate variability;
- working to strengthen these coping strategies, linking external knowledge with local knowledge;
- building links with local government and other stakeholders to improve community access to information and resources; and,
- using project experience as the basis for influencing government.

Learning from the project

Despite modest funding, the Strengthening Resilience of Communities to Cope with Climate Change project has brought together learning and experience from four South Asian countries to develop practical approaches to community-based adaptation to climate change. It is contributing to the developing body of knowledge on how to enable poor communities to cope better with climate change. The project has also helped influence international policy processes through workshops and side events at the United Nations Framework Convention on Climate Change Conference of Parties in Nairobi and Bali.

The project is only three years long so does not provide enough evidence that the technologies adopted by the communities will enable them to adapt to climate change. Nevertheless, many approaches and tech-

nologies based on improved natural resource management and livelihood strengthening offer ‘win-win’ outcomes of great benefit to communities. The real test for project success will depend on whether it can be scaled up.

A proposal for scaling up in Bangladesh

Practical Action has developed a bottom-up approach to scaling up that will be tested, particularly in Bangladesh, in the coming years. Links with local government and other stakeholders must be made to improve access to information and resources and ensure continuity of support after projects end. Raising awareness on climate change and its local impacts amongst local officials and politicians is important since local government knowledge is often limited. Experience shows that providing

information and guidance that is relevant to people’s regular work means it is more likely to be used. A further key aspect to scaling up is sharing information and experience through district- and national-level networks. Such networks are already active in Nepal and Bangladesh, and embryonic in Pakistan and Sri Lanka.

Practical Action is beginning to implement a new five-year strategy and in Bangladesh this includes an ambitious plan to involve other institutions in scaling up community-level livelihood strengthening based on sustainable agriculture. There are two principal stages. The first involves changing government policy on community-based extension, which currently favours a top-down approach with government experts sent out to farmers. Rather, a community-based extension system should be



Women in Bangladesh

Photo: © UNESCO (Bangkok)

built up, supported by government line departments who commit to update technical skills and by private agricultural service providers who would channel in inputs such as seeds, fish fry and other materials.

This new policy approach requires commitment from local government to listen to small farmer groups and facilitate implementation of plans made by community-based organizations. Local NGOs need to

food production, processing and marketing. For example, the International Rice Research Institute in Bangladesh should take up farming systems, going beyond purely rice research and adopting a livelihoods approach to its research programme.

Research institutes should run training courses for local NGOs to update their skills, since climate change is ongoing and will require continuous review of ap-

"this new policy approach requires commitment from local government to listen to small farmer groups"

support community-based organizations and link up with government line departments, research institutes and private service providers. Practical Action aims to establish Rural Technology Centres to act as a local source of traditional and scientific knowledge and skills.

For this policy approach to be effective, it is crucial that national and international NGOs and donors work with Practical Action to critically examine the community-based extension system described above. They must be in agreement regarding its effectiveness, and adopt and promote it through funding and other resources.

Changing policy is the first stage; the second is changing practice. First, national research institutes must take up the research needs of smallholder farmers on

appropriate technologies for adaptation. It is intended - and hoped - that local government will support the new Rural Technology Centres, and that donors will agree to finance projects following this model. Government and NGOs will need to allocate resources to promote exchange visits and farmer-to-farmer extension work to encourage sharing and learning.

Finally, local NGOs and community-based organizations will need to work together with the target beneficiaries to make decisions, and design and implement projects.

The authors welcome comments on the proposal for scaling up in Bangladesh outlined here, and any sharing of similar experiences. ■

ABOUT THE AUTHORS



● **Rachel Berger** joined Practical Action in 2001. After working to support programmes to strengthen livelihood security, she is now climate change policy advisor.



● **Mohammad Ali** leads the Practical Action, Bangladesh, programme on reducing vulnerability. He is a development professional with 30 years experience in smallholder integrated agriculture and non-farm income generation.

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FURTHER INFORMATION

● **On the Web:** Visit www.practicalaction.org for more information on Practical Action's community-based climate change activities.

From Bonn to Toyako

CLIMATE CHANGE TALKS

The Bonn Climate Change Talks took place June 2nd-13th, 2008. Mick Kelly and Sarah Granich report on this meeting and other related developments.

The Bonn Climate Change Talks consisted of sessions of the Ad Hoc Working Group on Long-term Cooperative Action, of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol and of the two Subsidiary Bodies of the United Nations Framework Convention on Climate Change. Over 2,000 people took part.

Movement along the road to Copenhagen, where agreement on a follow-up to the Kyoto Protocol is to be achieved in late 2009, is essential, said Yvo de Boer, executive secretary of the Framework Convention on Climate Change, opening the talks. "The world is expecting a Copenhagen deal to reach the goal set by science without harming the economy. Parties will need to make real progress towards this goal." "A critical

issue would be financial engineering: how to generate sufficient financial resources that will drive the technology into the market that allows developing countries to act, both to limit their emissions and to adapt to the impacts of climate change," he continued.

China, Brazil and Ghana have called for developed nations to create a fund to buy rights for them to use new climate-friendly technologies. "Technology transfer from North to South should not promote transfer of old aged and inefficient technologies," the Bangladesh delegate told the meeting.

There was continued opposition to World Bank control of climate funds. "With their long-term record of massive fossil fuel financing, the World Bank is spectacularly unqualified to control climate funds," said Karen Orenstein of Friends of the Earth United States.

According to a new report from the Institute of Policy Studies in Washington DC, the Bank's role in carbon markets is "dangerously counterproductive." The World Bank is "playing both sides of the climate

crisis," concludes Janet Redman, main author of the report. "It is making money off of causing the climate crisis and then turning around and claiming to solve it," she says. Instead of encouraging clean energy investors, the Bank is lending much of its financial support to the fossil fuel industry.

"We're not at the moment seeing the leadership from industrialized countries which I think is essential," warned de Boer, midway through the meeting. As the talks ended, he described the task of reaching agreement by the end of 2009 as "daunting." "It could well be said that we have been beating around the bush," said Chandrashekhar Dasgupta, India's representative. The United States, Canada and Australia, in particular, were accused by environmentalists of limiting progress.

On a positive note, "we are seeing a huge willingness on the part of developing countries to engage in working out a new pact in return for aid and technology," de Boer observed.

In a workshop on investment and financial flows, the Philippines, on behalf of the G-77/China, identified basic prin-

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ciples, including equity and direct access to funding by recipients. Barbados, for the Alliance of Small Island States, said that new resources should be channeled through the climate treaty process and proposed a Convention adaptation fund, an insurance mechanism and a technology fund. Mexico favours a world climate change fund on mitigation, adaptation and technology transfer, with participation of all countries and contributions according to greenhouse gas emissions, population and gross domestic product. Switzerland suggested a global carbon dioxide levy of US\$2 per tonne on all fossil fuel emissions, with an exception for less developed countries.

In a workshop on advancing adaptation through finance and technology, topics for discussion included various aspects of the National Adaptation Programmes of Action (NAPAs), such as the NAPA guidelines and coordination with national communications, the private sector's role in adaptation, funding sources for local adaptation policies and the use of vulnerability indices. India argued that promoting development can be one of the best adaptation strategies. South Africa supported both mainstreaming adaptation into development and individual adaptation actions. China proposed establishing a climate change adaptation committee under the Convention to assist work on adaptation, focused on developing coun-

tries, with regional adaptation networks to serving as a regional arm.

The latest Major Economies Meeting on Energy Security and Climate Change was held June 21st-22nd in Seoul, South Korea. This series of meeting stems from an initiative launched by the Bush administration in the United States and provides an alternative forum for intergovernmental discussion of the climate issue to the UNFCCC process. The Seoul meeting was charged with drafting a declaration for consideration at the Group of Eight (G8) summit of the major industrialized nations held in Toyako, Japan, July 7-9th.

de Boer called on the G8 leaders to reach agreement on mid-term greenhouse gas targets at the summit, as well as adopting a long-term goal. While it was "important to define the final destination of the journey", de Boer said, he was "also very interested in what the first stop on that journey is going to be." The European Union has called for a specific mid-term goal to be set for the year 2020.

In the event, the G8 leaders agreed to work towards the adoption of a goal of at least halving greenhouse gas emissions by 2050. They also acknowledged that mid-term goals would be needed to achieve this target. But the declaration was heavily criticized as not going far enough. "The G8 are crawling forward on emissions cuts at a time when giant leaps and bounds are needed," said Peter Grant of Tearfund.

Brazil, India, China, South Africa and Mexico attended the G8 summit. Luis Inácio Lula da Silva, president of Brazil, has urged developing countries to join the industrialized nations in setting greenhouse gas emissions targets. "All participants, including our country, should set a reduction target in accordance with their own emissions of greenhouse gases," da Silva said ahead of his attendance at the summit. India's position is that industrialized countries should meet their own commitments rather than "pointing fingers at countries like India" and asking developing countries to limit their emissions, according to principal climate negotiator Shyam Saran.

The next major stop on the road to Copenhagen will be in Accra, Ghana, in August 2008. There is concern about the human cost of the intense meeting schedule in the run-up to the Copenhagen deadline, with three months out of the next eighteen devoted to negotiating meetings. ■

● Further information: Earth Negotiations Bulletin at www.iisd.ca/climate/sb28/ has produced daily reports from the Bonn Climate Change Talks and an overall summary of the meeting's outcome. News of the climate negotiating process and related issues is updated hourly in the Tiempo Climate Cyberlibrary at www.tiempocyberclimate.org/newswatch/newsfeed.htm.



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Community-based adaptation

Climate change impacts disproportionately affect the poor. Impacts will intensify yet poor communities already struggle to cope with current climate shocks. Helping them adapt to climate change is vital but daunting. Some international funding is available, but giving poor country governments money does not mean that it will reach the most vulnerable.

One approach to the problem that deserves greater support is community-based adaptation (CBA). This begins by identifying the communities most vulnerable to climate change. These communities are generally very poor, depend on natural resources and occupy areas already prone to shocks such as floods or droughts. CBA fieldwork to date reveals that outsiders must then gain the trust of the communities they want to help. This can mean spending time with the community, or working through trusted local intermediary organizations. Identifying

appropriate adaptation options should then follow, building on information about existing community capacity, knowledge and practices used to cope with climate hazards.

Climate change is initially a confusing concept to many. Communicating climate change requires translating scientific texts

into local languages and, importantly, using art, theatre and video.

Once established, an adaptation project is like any standard development project. The difference lies not in what the intervention is but in the inputs to the intervention. The adaptation element introduces the community to climate risk and

factors this into activities.

Lessons from CBA so far reveal that it is impossible to learn the theory of CBA in a university or training workshop and then apply it in the field; learning comes from practice itself. Whilst CBA theory and practice are in their infancy, both are likely to grow. The Global Environment Facility Small Grants

Programme already supports several CBA activities (sgp.undp.org/web/focalareas/adapt/climate_change_adaptation.html). Practical Action also has several projects working with local communities to help them adapt to climate change (practicalaction.org/?id=climatechange_adaptation).

Sharing experience and knowledge from pilot activities amongst practitioners, policy makers, researchers, funders and the communities at risk is essential. In view of this, the Second International Workshop on CBA was held in Dhaka, Bangladesh, in February 2007 (www.bcas.net/2nd-cba/index.html). Those present also formed the CBA Exchange (CBA-X) to promote knowledge sharing on CBA activities (www.cba-exchange.org). CBA is also discussed at the annual Development and Adaptation Days event (www.dcdays.org).



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