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Perspectives

Water Security and Climate Change Creating Resilience in the Most Vulnerable Regions

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TREACHEROUS HIKE: A man shades himself from the sun with an umbrella as he carries drinking water across the dry bed of the Upper Lake in Bhopal, India.

Floods ravage the countryside of Pakistan, as changing precipitation patterns exacerbate development problems. Glaciers melt in mountain ranges from Peru to Nepal, changing water availability and causing unpredictable outbursts. The low-lying atolls of the Maldives are gradually inundated as the Indian Ocean rises, increasing the impacts of storm surge. Increased sea surface temperatures in the Indian Ocean impact the monsoon cycle and precipitation patterns in east Africa. These current events are indicative of potential future situations with the extreme and unpredictable conditions wrought by climate change.

Though the direct link between climate change and a specific event or human cause is debatable, it is clear that water is a major player in its impact on development. The economic and social impacts of climate variability in developing countries underline the need to help partner countries gain the institutional capacity for resilient economic growth as climate changes.

“Climate change ... is a fundamental, multi-sectoral, multi-disciplinary development issue, with serious implications for the sustainability of every nation’s development agenda.”

Climate change poses a serious threat to billions of people, especially those living in the developing world, with the potential to dramatically affect living conditions, livelihoods, health and well-being on a global scale. As USAID and its partners seek viable solutions to enhance water security around the globe, it is undeniable that climate change adds yet another factor to the multi-layered set of challenges that must be analyzed and addressed to achieve development goals.



Photo Credit: 2009 Min Zarni Zaw (Anarapura), Courtesy of Photoshare



DWINDLING RESOURCES: A woman fetches water and carries it back home by bullock cart in a dry region of Myanmar. The water is used for drinking, cooking, and washing.

Clearly, water security and climate change are inextricably linked. Climate change is not an independent sector, a special interest, or an environmental issue. Rather, it is a fundamental, multi-sectoral, multi-disciplinary context for progress going forward with serious implications for the sustainability of every nation's development agenda.

Development efforts for the coming century require science-based solutions that consider the following: increasingly variable future climate; taking into account water demands from multiple development priorities such as energy and agriculture; the evaluation of water resources and reservoirs above and below-ground; utilization of emerging innovative finance opportunities such as indexed insurance and payments for ecosystems services; and addressing stakeholders' preferences and economic opportunities.

Problem assessment and project design must include a longer time horizon and apply ecosystem approaches and lessons learned from the unintended consequences of engineered waterways. Careful integration of climate adaptation and mitigation efforts into water-related programs can provide economic returns and ensure sustained benefits. For a growing number of countries, their own water security hangs in the balance of the success or failure of these efforts.

Increased sea water temperatures, ocean acidification, vulnerability to sea level rise, and saltwater intrusion to coastal aquifers are further manifestations of a changing global climate

Photo Credit: 2007 Zahidul Salim, Courtesy of Photoshare



LIFE MUST GO ON: A housewife cooks in her flooded home in Kamrangirchar, Dhaka, Bangladesh.

directly relevant to water security. In short, an effort to manage water resources in an integrated, holistic manner is perhaps the most critical climate adaptation strategy countries can and should be taking today.

To address these challenges, USAID is informing water resources management efforts through increased access and capacity for use of future scenarios by which program stakeholders can better understand the increasing vulnerabilities they may face and identify their own path forward. Combining traditional and proven best practices with the latest technology and research offers a multitude of solutions to addressing water concerns exacerbated by climate change.

Photo Credit: 2010 Khalid Raja, Courtesy of Photoshare



VILLAGE DEVASTATION: An aerial view of houses surrounded with flood water in flood affected areas of Thatta, Pakistan.



Photo Credit: 2009 Kunle Ajayi, Courtesy of Photoshare

STRUGGLING TO SAVE POSSESSIONS: Men push a car along a flooded roadway in the Ikeja area of Lagos, Nigeria.

This edition of Global Waters explores the unique and multi-layered challenges that climate change brings to the water sector, and reports on USAID’s efforts to effect collaboration and cooperation among governments, NGOs, communities, scientists, and individuals to work toward long-term solutions. Here are some of the topics covered inside this issue:

The “Peaks to Coast” Program in Peru unites scientists from the Andes in Peru and the Himalayas in Nepal to share information and possible solutions to impending glacial melt on two vastly different mountain ranges thousands of miles apart.

The Soil Management Collaborative Research Support Program that USAID has co-funded and developed with the University of Hawaii demonstrates innovative farming techniques to reduce soil erosion and increase crop yields in Mali without compromising the agro-ecosystem.

As the lowest country on the planet, the Maldives presents unique challenges for water-security and climate resiliency. Our article examines this microcosm of challenges and a new USAID program to develop ‘climate resilient islands’ in partnership with the Government of the Maldives.

A collaborative effort is underway by USAID and multiple national meteorological and hydrological services and disaster

management entities to support an initiative to assess flood early warning and technical, institutional, and capacity-building issues related to flood preparedness in the Zambezi River basin.

USAID’s Water Energy Nexus Activity initiative, known as WENEXA, unites India’s water and electricity sectors in a public-private partnership to simultaneously conserve energy and water resources, reduce greenhouse gases, lower costs, and increase income for farmers.

Collectively these articles provide an inside look at some of the collaborative and often trans-boundary approaches USAID and its partners must implement to effectively respond to a changing global climate. Looking forward, the development community will need to apply both traditional stakeholder engagement and innovations from science, technology, and finance to increase economic opportunity, stability, and human well-being. USAID’s ultimate goal is to find long-term solutions that address the complexities of creating a water-secure world within the context of the many additional challenges that climate change brings to bear.

Bill Breed, Global Climate Change Team Leader, USAID/EGAT



In Focus

Navigating the Unpredictable Seas of Climate Change in the Maldives



Photo Credit: iStock

SINKING ISLANDS: An overview of the Maldivian Islands, the lowest country on the planet.

With an average elevation of 1.5 meters above sea level, the Republic of Maldives is the lowest country on the planet. It is also ground zero in the struggle against rising seas associated with climate change. About 400,000 Maldivians live on this chain of 1,200 tropical islands and coral atolls stretched across the Indian Ocean 500 miles southwest of Sri Lanka. In 2004, they watched the Indian Ocean tsunami wash over 20 islands. Today they keep a wary lookout for the increasing number of storm surges that erode beaches and swamp local communities. The global climate change community is also watching this island bellwether closely.

UN scientists predict sea level rise of up to one meter by the end of the century, which would result in the disappearance of many low-lying islands in the Maldives and cause seawater to contaminate groundwater on the remaining islands. Some of the strategies under consideration to relieve this dire situation call for buying land elsewhere and relocating the population

to another country; or implementing a coherent coastal management plan that would include seawall construction, land reclamation, and green technologies. For the Maldives, it is a choice between a serious look at adaptive strategies and a future that is far from certain.

Faced with these tough choices, the Government of the Maldives is taking decisive action to implement innovative and forward-thinking solutions to protect communities from rising seas. In addition to building seawall infrastructure, the government plans to invest \$1.1 billion over 10 years in alternative energy technologies including rooftop solar arrays, wind turbines, and biomass burning power plants. To further demonstrate its commitment to surviving these seas of change, the country is setting its sights on being the first nation to be carbon neutral by 2020. Such an effort by the tiny nation is not likely to make much of a dent in total worldwide carbon dioxide emissions, given that the Maldives account for less than 0.1% of the



total output. But the symbolic gesture demonstrates President Mohamed Nasheed's leadership in addressing global climate issues far beyond the shores of the Maldives. "Going green might cost a lot," Mr. Nasheed said in a recent op-ed article, "but refusing to act now will cost us the Earth."¹

To support the Government of Maldives in meeting its goals for climate resiliency and water security, USAID will implement the *Program to Enhance Climate Resiliency and Water Security* beginning the second half of 2011. The program will complement government strategies through an integrated water resources management approach that strengthens resiliency through community mobilization, capacity building, and the use of innovative technologies. The program will facilitate dialogue among stakeholders at all levels to identify options and solutions to the challenges of water scarcity, sea level rise, and other likely impacts of climate change.

"The proposed project will increase the resilience of freshwater resources through integrated water resources management in the densely populated island of Lh. Hinnavaru and Ha. Dhidhdhoo," said Ms. Shaheeda Adam, Director General at the Ministry of Housing and Environment for the Maldives. "The project will ensure reliable and equitable access to the island communities' safe freshwater in a changing climate. The health of the Maldivian communities will improve and they will all enjoy a better life," she added.

With a budget of \$7.3 million, the program is designed to mobilize the communities it serves and work with provincial utilities to design, build, and operate seawater desalination facilities to deliver clean drinking water to the two islands. Each of these communities is home to about 4,000 people who already face water scarcity problems associated with poor sanitation practices, salt-water intrusion, and limited quantities



CONSTRUCTING A FUTURE: Coastal reclamation near the sea outfall on Dhidhdhoo Island.

Photo Credit: Priyanka Dissanayake

"For the Maldives, it is a choice between a serious look at adaptive strategies and a future that is far from certain."

of rainwater harvested from rooftop catchments. Both islands are undergoing land reclamation projects that will secure coastlines and provide additional living space for migrants from adjacent low-lying islands. The growing populations will put even greater pressure on water resources for these two population centers. The program will bring together key stakeholders in the water sector and help them consider alternatives for water system design, management, and cost-recovery. "People face severe water shortages in the dry season," said Ms. Priyanka Dissanayake, activity manager for USAID/Sri Lanka, which will oversee the program. "A key element of our strategy is to emphasize capacity building and to provide solutions that fit the unique needs of these communities," she added.

In order to address both short-term water needs and build resiliency to long-term climate change, the program will utilize Sea Water Reverse Osmosis (SWRO) technology for potable



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Photo Credit: iStock



DISAPPEARING BEAUTY: USAID is working with the Government of Maldives to develop “climate-resilient islands.”

water and help build the capacity of provincial utilities to provide this and other services in a sustainable manner. To ensure sustainability, the utilities will collect fees for water provision, sewerage, solid waste collection, and other services. Renewable energy options will be assessed for the SWRO units, island power generation, and other uses. As part of an ecosystem-based approach, seawater desalination will complement other water resource management practices such as rainwater capture, groundwater rehabilitation, and preservation of natural catchment areas.

Ultimately, USAID hopes the program will serve as a model for other small islands in the Maldives and elsewhere seeking integrated solutions to the challenges of rising sea levels. “We anticipate this program will mobilize communities and encourage them to make good choices about their land and water use,” said Richard Volk, senior coastal manager for USAID. “Within this framework, the

program will demonstrate the value of desalination technology and improved management of rainwater and groundwater resources, as critical components of an integrated approach to water resources management on low-lying, small islands.” USAID expects the approach to allow communities to be more resilient to climate change through greater understanding of climate vulnerabilities and the application of viable adaptation strategies.

Clearly, much is at stake in this effort. If successful, the *Program to Enhance Climate Resiliency and Water Security* in the Maldives will not only provide immediate solutions to water scarcity problems, it will also empower Maldivians to implement long-term strategies that will allow them to keep living on these fragile islands for at least decades to come. Perhaps the residents of Dhidhdhoo and Hinnavaru will be the first to be able to claim they are indeed “climate resilient communities.”
S. Nelson



Photo Credit: 2006 Henrica A.F.M. Jansen, Courtesy of Photoshare

DEFENDING THE ISLANDS: Grant aid from the Japanese government financed this seawall on the southern coast of Male', Maldives.

¹ A statement issued by Maldives president, Mohamed Nasheed, published in the London Observer on March 15, 2009. Following is the link to the Observer: <http://www.guardian.co.uk/environment/2009/mar/15/carbon-emissions-climate-change>

For more information, visit:
http://maldives.usvpp.gov/usaaid_in_maldives.html

In Focus

From Drumbeats to Keystrokes Flood Warning Systems on the Zambezi River



Photo Credit: Same Houliand

COMMUNITY DESOLATION: Flooding at Zambezi River, Central Mozambique.

The Zambezi River has always experienced periods of flooding. For countless generations, residents of the Zambezi River Basin relied on the regular deposit of rich sediments from flooding for growing crops and providing ample amounts of food from productive freshwater fisheries. These populations adapted to seasonal flooding by devising traditional warning systems – drumming the message of imminent flooding from one community to another – which allowed households ample time to move to higher ground. When the flood waters receded, the residents returned and planted crops in the enriched soils. Life along the Zambezi River Basin was not easy. But by incorporating an understanding of seasonal flood risks and community-based early warning into their lives, communities along the Zambezi mitigated the river’s risks, while reaping its rewards.

The Zambezi River, the largest in Southern Africa, runs for 2,220 miles through seven riparian states, including Angola, Botswana, Namibia, Malawi, Mozambique, Zambia, and Zimbabwe. The Zambezi River Basin covers over 54 million square miles (140 million square kilometers) and is home to over 32 million people. Over this wide area, many vulnerable communities have been affected as the frequency of intense and damaging floods and droughts along the river has increased in recent years.

The traditional balance achieved by river communities in mitigating risks while gaining rewards began to change with the construction of two hydroelectric dams and reservoirs, the Cahora Bassa in Mozambique and the Kariba between Zambia and Zimbabwe, on the Zambezi River in the 1970s. The dams were built to provide electricity that would enable the



development of other economic activities in the region and decrease the heavy dependence on the agricultural sector. However, the dams altered the natural cycle of flooding on the river, making the pulses of water irregular. Although this decreased flood risks by regulating river flow, agricultural productivity declined as alluvial soils were no longer deposited on the flood plains. Productivity of fisheries declined as well.

As more people moved onto the Zambezi flood plains with reduced seasonal flooding, these residents became more vulnerable to now irregular, more intense flooding. That vulnerability compounded by the effects of changes in land use, environmental degradation, and the pattern of water release from the dams, which may be exacerbated by climate change. Affected communities' risk factors are especially heightened when higher than normal inflows occur simultaneously with tropical cyclones. The ensuing floods take lives, destroy homes, kill livestock, ruin standing crops, and damage or destroy essential infrastructure. Water- and vector-borne diseases – from dead livestock, sewage, and stagnant water that encourages breeding of malaria-bearing mosquitoes – have increased significantly, undermining the health of communities in the river basin.

Traditional warning systems do not meet the needs of such an expansive population spread over so many countries. "Our country is extremely vulnerable to floods, being the most downstream in the Zambezi basin. But we must rely on information from the upstream countries to better predict flood times and risks," said Mr. Mussa Mustafa, of Mozambique's National Institute of Meteorology. Limited infrastructure for timely sharing of meteorological and hydrological information among the Zambezi basin countries has handicapped preparation



SURVEYING THE DAMAGE: Touring the site of Mphanda Nkuwa Dam, proposed for a rural part of Mozambique.

"What is needed, in effect, is a modern equivalent of the traditional warning system that spans the countries within the basin, where drums are replaced with more contemporary prediction and early warning and communication systems."

for and mitigation of floods in the region. "The water does not know when it is coming into another country! We should flow like the water (in sharing information)," said Mr. Mustafa. What is needed, in effect, is a modern equivalent of the traditional warning system that spans the countries within the basin, where drums are replaced with more contemporary prediction and early warning and communication systems.

USAID's Office of Foreign Disaster Assistance (USAID/OFDA), is partnering with the World Meteorological Organization, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, and the national meteorological and hydrological services and disaster management agencies of the Zambezi River Basin countries to effectively address this specific concern. USAID/OFDA is supporting a program to assess flood forecasting and early warning capacity and develop a basin-wide strategy to flood early warning. The Zambezi River

Photo Credit: Lori Pottinger, 2008 International Rivers

Photo Credit: Patri Viljoen



LOSING GROUND: One of hundreds of villages flooded during the Zambezi River's 2009 flood.

“The activities we support are primarily at the local or community level. Things like water harvesting, reforestation, better soil and land management, and more efficient farming. But linking them to a regional flood early warning system will make them so much more effective,” said Farid Aiyawar, International Federation of Red Cross and Red Crescent Societies (IFRC) Disaster Management Coordinator. Linking the regional strategy to IFRC activities in the Zambezi River Basin, as well as other FFEWS pilot projects, will address both root causes and the community-level impact of recurrent

Basin Flood Forecasting and Early Warning System (FFEWS) project will address the technical, institutional, and capacity-building issues related to developing flood preparedness and early warning systems.

The project will be implemented through the following activity areas: 1) regional and national consultations to identify information and capacity gaps and the development of strategies to address these gaps; 2) basin-wide meetings of riparian hydro-meteorological and disaster management organizations; 3) the development and implementation of a demonstration project involving a flood forecasting system in the area covering the lower Zambezi catchment (including the border area between Malawi and Mozambique); and 4) the compilation of a proposal for a basin-wide flood early warning strategy.

In December 2009, a regional consultation meeting was organized in Maputo, Mozambique to implement the first activity. Based on the discussions at the meeting, the Zambezi River Basin countries have achieved a regional consensus on the development of a flood forecasting and early warning system for the Basin, including real-time sharing of flood warnings and hydrological information. By virtue of the size of the river basin, the effort involves all the affected riparian states – an acknowledgement of their interdependence and the need for regional collaboration.

floods as well as assess the impact of the regional strategy and information sharing on local disaster risk reduction activities. The Zambezi River Basin FFEWS project is one of several ongoing projects funded through USAID's OFDA, working to reduce vulnerability to hydro-meteorological hazards while promoting integrated, resilient responses to the effects of climate change.

While continuing to provide multiple benefits to communities, the evolving flood patterns along the Zambezi now present greater challenges, which increase risks for already vulnerable residents in these areas. The long-established systems for ensuring household and community livelihoods have been disrupted, leaving the well-being and economic development of the region's inhabitants gravely threatened. The development of a sustainable, integrated flood early warning and mitigation strategy in the Zambezi basin will enable the inhabitants to increase resiliency to climate variability and adapt to the effects of climate change, reducing the negative impact of potential floods in this vast and vulnerable region.

J. Hutchins

For more information, visit:

http://www.thewaterchannel.tv/index.php?option=com_hwdvideoshare&task=viewvideo&Itemid=53&video_id=683 (video)

<http://www.wmo.int/pages/prog/hwrp/FloodForecastingZambezi.html>



Real Impact

Innovative Farming Practices in Mali Lead to Transformative Change

In Fansirakoro, a small town in the Upper Niger River Valley of Mali, a local farmer asks University of Hawaii researcher Richard Kablan to come and see something behind his house. The rains in Fansirakoro fall sporadically and water scarcity is a real concern. Until recently, residents even became nomadic for a few months of the year when local wells ran dry.

Walking to the back of the house, the farmer shows Kablan not only a field full of crops, but also two oxen and a plow – items he was able to recently purchase for the first time in his life.

Many years earlier in 1997, the USAID Soil Management Collaborative Research Support Program (SM-CRSP) introduced a new soil management technique to the area called *aménagement en courbes de niveau* (ACN), which translates roughly as ‘ridge tillage.’ Working in close collaboration with Mali’s Institut d’Economie Rurale and the University of Hawaii, SM-CRSP worked across the region to improve food security through better agricultural practices.

According to Russell Yost, the principal investigator under SM-CRSP, “The soils [in this region] have a very low infiltration rate – they crust – and when the rain falls, it largely runs off ... We found that upward of 60% - sometimes as high as 80% or 90% - of the rain actually turned into runoff and did not infiltrate the soil.” For local farming families, this has meant poor crop yields and periodic water shortages.

The ridge tillage technique was originally developed in Mali by the Agricultural Research for Development Center (CIRAD). Working in conjunction with Dr. Mamadou Doumbia and his team at the Institut d’Economie Rural, CIRAD began testing ACN in the Malian town of Siguidolo in 1994. USAID picked up this work in 1997, and according to Dr. Doumbia, helped make ACN what it is today.



SUCCESSFUL TRANSFORMATION: A boy in Siguidolo irrigates lettuce using water from a local well.

“Two years after putting the technology in place in Siguidolo, the farmers called us and asked us to come back. They told us that they’d noticed young trees growing, and that they hadn’t seen anything like them for the past 15 years.”

When USAID staff traveled to Siguidolo to see ACN for the first time, “... frankly, we were blown away with its wonderful success,” said Mr. Yost. To put this in perspective, he explained that Siguidolo has very little rainfall – even less than Fansirakoro – yet with ACN, Siguidolo’s residents were able to grow crops with high water requirements, like corn.

Photo Credit: Richard Kablan



1. LAND SURVEY



2. CONSTRUCTING THE ADO



3. AN ADO AFTER PLANTING



STEPS TO GROWTH: The process of introducing ACN technology.

Photo Credit: Kevin Brannan & USAID "ACN Water Harvesting Technology Module, 2008"

The ridge tillage process begins with a relatively low-tech topographic survey of a farmer’s land to identify water flow problems. Working closely with soil and water conservation technicians, the farmer next determines the ideal locations for *ados*, or ‘earthen ridges’ that parallel topographic contour lines. The farmer then uses an ox-drawn plough to construct the *ados*, which will remain in place for years to come.

This relatively simple intervention has had wide-ranging impacts on food security and ecosystem health, and supporters hail it as one of the most successful soil management techniques to combat the low infiltration rates of West African soils.

ACN dramatically increases infiltration, boosting crop yields by 30%. By reducing surface run-off and soil erosion, the technique also helps soils retain important organic nutrients and fertilizers that would otherwise wash away.

According to research conducted under SM-CSR, farmers that combine ACN with fertilizer application have seen crop yield increases of around 50%.

“This is not the kind of technology where you have to wait for several years to see something happen. The minute you put it in the ground, you see the crops respond,” said Richard Kablan.

According to USAID’s contracting officer’s technical representative for the project, Michael McGahuey, the impact on farmers’ bottom line is significant: “Based on the documented yield increase of 30-50%, it is estimated that the value of the annual yield increase ranges from \$40 to over \$50 per hectare.” The benefits of ridge tillage do not stop there, however.

Dr. Doumbia noted, “Two years after putting the technology in place in Siguidolo, the farmers called us and asked us to come back. They told us that they’d noticed young trees growing, and that they hadn’t seen anything like them for the past 15 years.”

Curious to understand this resurgence of local plant biodiversity, Dr. Doumbia and his team began taking measurements. They soon realized that ACN enables rainwater to penetrate well below the crop-growing zone, reaching depths down to two meters. In this way, ACN was helping fuel the regeneration of indigenous plants and commercially important perennial trees such as *V. paradoxa*, the shea butter tree whose oil is collected and sold by local women.

ACN also facilitates carbon sequestration by boosting plant biomass. Though it remains challenging to quantify this impact, there may come a day when Malian farmers could receive credit in international carbon markets for improving local soil management practices.

Back in Siguidolo, a rising water table also enabled local women to start home gardens. Richard Kablan recalls that one woman, Sorofin Diarra, was so keen to take advantage of the improved growing conditions that she started her own home garden in the middle of one of SM-CRSP’s test plots. Today, as a direct result of ridge tillage, about 80% of all households in Siguidolo have such gardens, growing crops like lettuce, tomatoes, and onions. These gardens continue to provide crops well into the dry or ‘hungry’ season, which can last up to eight months in the arid Sahel.



Photo Credit: Russell Vost

REJUVENATED LAND: Dr. Doumbia (left) and farmer Zan Diarra observe a baobab tree that regenerated following the establishment of ACN.

Years into the project, “impacts kept popping up,” recalls Dr. Doumbia. The farmers soon called CRSP researchers once again, this time to report that their wells still had water, despite the fact that the dry season was well underway. He and his team soon confirmed that ridge tillage facilitated even deeper infiltration, helping recharge the groundwater aquifers that feed local wells.

On a regional scale, there is evidence that drier conditions are moving southward from the Sahara and down into the Sahel. With less reliable rainfall and increased water scarcity, ACN has a clear role to play in helping families better prepare for the effects of climate change. After introducing the technology to Fansirakoro, Siguidolo, and elsewhere in Mali, USAID-CRSP took the technology to Gambia and Senegal where the results were similarly impressive.

Today, *L'Association Malienne d'Eveil au Développement Durable*, the local NGO in Mali that provides technical assistance to farmers during the initial diagnostic, is having trouble keeping pace with demand. Part of the challenge is obtaining the funds needed to support roll-out of the technology, as SM-CRSP came to an

end in 2008. Though ACN work does continue under a sister USAID Project (SANREM-CRSP), people affiliated with SM-CRSP wonder if the scale is large enough.

“We have a strong case, as we can show impacts,” Dr. Doumbia stated. “And the impact keeps building and building and building. If somebody wants to show impacts quickly – I mean quickly – then invest in ACN. Today, ACN has been extended to thousands of hectares [in Mali]. Imagine where would we be if we could bring one or two million hectares under ACN...The potential is so great.”
L.K. ole-MoiYoi

For more information, visit:

<http://tpss.hawaii.edu/sm-crsp/>

http://pdf.usaid.gov/pdf_docs/PDACO310.pdf



News From The Field

Learning from the Mountains

Exchanging Knowledge and Solutions from the Andes to the Himalayas

Photo Credit: Nora Fern



FADING RESOURCES: Glaciers have been receding over the last few decades at an alarming rate as a result of climate change. This is causing concern about the health of Peru's watersheds and the future of the country's water supply.

Climate change is not a new concept for people living in the Andes Mountains. The Peruvian section of this mountain chain is home to 70% of the world's tropical glaciers, and Peru's population depends on the water provided from these glaciers to irrigate their fields, generate power, and supply their homes. However, these glaciers have been slowly receding over the last few decades as a result of climate change, causing concern about the health of Peru's watersheds and the future of the country's water supply.

In the past, farmers and herders in the highland areas of Peru have used ancient methods of adaptation, such as crop diversification, to help them cope with changes occurring in the environment. But the glaciers of Peru are melting faster than many scientists had previously projected, and now some predict that Peru will experience complete loss of the glaciers in ten years.¹ This will pose unique challenges for both the short- and long-term water supplies of Peru. "In the short-term, faster glacial melt can mean more water," said Nora Fern, a climate change analyst on the USAID Global Climate Change

"Climate change is happening. That is a fact. Nature doesn't understand and stop at political boundaries."

Team. "But once this runs out, there will be more water scarcity."

In order to help the people of Peru plan for these changes, USAID has partnered with The Mountain Institute (TMI) through the "Peaks to Coast" program, designed to help Peruvian stakeholders understand the impact of climate change and identify potential solutions. "The project's overall goal is to help Peru

identify ways to adapt to receding glaciers by protecting the high ecosystems," stated Jorge Recharte, program director for TMI's Andean Program. "Indigenous populations own and manage lands. If they can find innovative ways to do it better, then this sustains their livelihoods."

TMI takes a two-pronged approach to addressing potential water insecurity within Peru. Using a training methodology developed by USAID, TMI first works with local communities in both the highland and lowland regions to help each community identify their needs and build on existing adaptation strategies. "Communities need to think of their own answers and adaptations," says Mr. Recharte. "TMI works with communities so they have a chance to think about what's happening to the land and come up with solutions that they can then take to local governments."



¹ <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/16/AR2011011604900.html>

New adaptation mechanisms include building irrigation canals and water catchments for the highland people and setting up payment options for lowland communities to help fund adaptations upstream. One interesting outcome of the training sessions, according to Mr. Recharte, is that residents in the lowlands have expressed interest in opening a dialogue with residents in the highlands to gain a better understanding of changes to the highland ecosystem.

TMI's second objective in Peru is working with local governments, particularly at the municipal level, to develop policy and invest resources in conserving their local watershed. TMI helped foster the Three Watersheds Commonwealth, the first commonwealth of municipal governments in Peru focused on climate change and water management. "It's exciting," says Mr. Recharte. "By bringing ten different municipal governments together as one entity we can invest more and do larger projects with more impact. We're now actually developing projects, getting funds, and implementing pilot projects. This is responding to climate change as a long-term process."

In addition to these two activities, TMI and USAID also work on increasing the flow of knowledge on impacts and potential solutions between individuals and countries concerned with glacial retreat. In 2009, USAID and the National Science Foundation partnered with TMI to fund and organize a conference titled "Adapting to a World Without Glaciers: Realities, Challenges, and Actions." It specifically focused on the impact of climate change to water supplies, highlighting potential gaps in research, and the need to work with local communities to help address these challenges. "The conference



Photo Credit: Nora Farn

IMPLEMENTING TECHNIQUES: In a training session, participants discuss criteria for choosing adaptation options.

in 2009 was convened to bring scientists who were working in the Andes together with decision makers to initiate a dialogue and begin to design a plan," Mr. Recharte explains.

Also in attendance at the conference were researchers and decision makers from the Hindu Kush-Himalayan region of Asia. The Himalayan region is also adapting to the impact of glacial retreat, although these impacts have not been as rapid as in Peru. TMI and USAID are facilitating an ongoing knowledge exchange between the two regions, to support them in working together to explore new ways to cope with the impacts of climate change.

Participants in the 2009 conference identified a need for a follow-up conference in 2011 to allow for additional dialogue between the two regions. This conference, titled "Adapting to a Changing Mountain World," is planned to take place in two parts in September and October in Nepal.

The Andes and Himalayan regions are not the only two areas experiencing negative impacts from climate change. As weather variability increases, many countries will need to develop their own adaptation measures. "Climate change is happening. That is a fact," says Mr. Recharte. "Nature doesn't understand and stop at political boundaries."

C. Gumann



Photo Credit: The Mountain Institute

LAY OF THE LAND: Community members from Huasta identify sites with quenuel forests for Private Conservation Areas. Quenuel forests are made up of *Polylophos sp* trees which grow at very high altitudes. These forests are particularly important for water capture in these high-mountain ecosystems.

For more information, visit:

<http://global-warning.org/main/peru/>

<http://www.mountain.org/>

News From the Field

WENEXA

Water + Electricity = Reduced Emissions in India

Photo Credit: WENEXA Project



PUMPING UP PRODUCTIVITY: Indian agriculture depends heavily on groundwater, which must be extracted with electric pumps.

“If we save water, we save energy, too – and vice versa.” That is the motto of the Water-Energy Nexus (WENEXA) program, an innovative public-private partnership in India, supported by USAID, that aims to reduce greenhouse gasses by conserving water and energy which are in dangerously short supply in a nation with a huge and ever-growing population. Demand for these resources is expected to double in the next 25 years. Water and energy are closely linked in the vital agricultural sector, which accounted for more than 17% of GDP and employed more than half of the national workforce in 2010.

Indian agriculture depends heavily on groundwater, which must be extracted with electric pumps. The current situation poses a critical challenge because the notoriously inefficient older pumps waste far too much electricity. Electricity in India is priced significantly below cost due to large subsidies, so farmers tend to over-consume energy for irrigation, which has led to

an alarming depletion of groundwater levels. The uncertain availability of power leads farmers to draw more water than they need, compounding the problem.

In Karnataka, the largest Indian state in the south, the looming water crisis is easy to measure and visualize. Karnataka’s water table is unusually deep at 400-700 feet. “After a lot of analysis, it was decided that we needed to intervene in Karnataka’s agriculture sector to effect savings in both water and energy,” says Rakesh Kumar Goyal, chief of party for WENEXA. That dual focus, Mr. Goyal emphasizes, is the most distinguishing and important feature of WENEXA.

In 2004, USAID/India and the Government of India’s Ministry of Power launched WENEXA and contracted with Tetra Tech to determine possible financial models to replace existing pumps.



USAID provided \$5.8 million for technical assistance and capacity building for the program. A public-private partnership agreement was signed between the state utility and private energy service company (ESCO) to replace the pumps. The ESCO obtained a loan from the national agricultural bank to replace the existing pumps with new, energy efficient models.

Officials implementing WENEXA enhanced its effectiveness through careful planning, involving many entities. For the initiative to succeed, local farmers had to be willing to embrace pump efficiencies, adopt irrigation technologies, and agro-forestry practices. To achieve that goal, a Bangalore-based NGO interacted regularly with the farm community, organizing focus group discussions, training programs, and exposure visits.

To date, more than 500 farmers have been educated about the importance of creating energy/water efficiency and how to realize it. For individual farmers, achievement came principally via new hardware - the energy efficient pumps save electricity. Replacing old pumps has the potential to save 46% in electricity consumption.

“This has been a very challenging project, but one of high impact, as well,” says Ms. Apurva Chaturvedi, USAID Program Management Specialist for WENEXA. “The concentrations of resources into a single end-use area make the water-energy nexus an imperative challenge for the future of India. USAID’s WENEXA program has tried to address this complex problem, and we are very pleased with the results.”

USAID/India and the Ministry of Power envision the positive results from WENEXA spreading across the country. The state governments of Karnataka and Maharashtra are very supportive and would like to see the program introduced in their respective states.

“With an investment in the initiative of \$13.2 billion,” the joint report from USAID/India and Ministry of Power states, “India could reduce its electricity demand-supply gap by 50% and its annual agricultural tariff by 9 billion rupees [\$200 million] a year.” Those savings “can be used for power-sector upgrades in areas where savings are being realized and for other development needs of the states ... The multiplier effect of



Photo Credit: WENEXA Project

EFFICIENT PRACTICES: Farmers use a USAID-sponsored energy-efficient pump to save electricity and make farming more productive.

“To date, more than 500 farmers have been educated about the importance of creating energy/water efficiency and how to realize it.”

fresh investments will be reflected in employment and income generation.”¹

The multiplier effect will not be limited to those outcomes. As Goyal points out, “We have already been influencing policy in other Indian states.” The influence goes well beyond policy. As water and energy are conserved, energy emissions are reduced, allowing the program to positively impact the country’s effect on climate change.

WENEXA, with its USAID backing, has turned a lose-lose situation into a very effective win-win.

R.M. Williams

¹ USAID/India and Ministry of Power, Government of India, Water-Energy Nexus (WENEXA II) Project: Agricultural Demand-Side Management.

For more information, visit:
<http://www.waterenergynexus.com/>



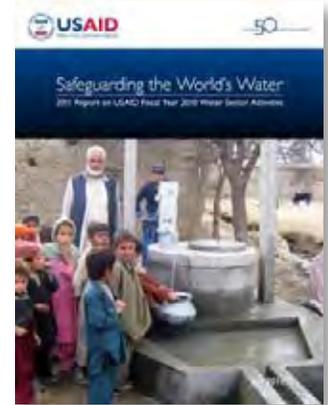
Resource Center

In Print

Safeguarding the World's Water

In late August, USAID will launch *Safeguarding the World's Water*, the 2011 report on its FY 2010 Water Sector activities around the globe. The report offers detailed information about the agency's investments and partnerships. In 2010, USAID invested \$643.7 million in water-related activities, with most going to Asia, sub-Saharan Africa, and the Middle East. Most investments were in the WASH sector, altogether reaching \$522 million. More than 2.8 million people were provided with improved drinking water supply and 2.9 million people with improved access to sanitation facilities. Nearly 12 billion liters of drinking water were purified using point-of-use treatment products, of which more than 10 billion liters went to residents of African countries.

For more information, visit: www.usaid.gov/our_work/cross-cutting_programs/water



On Video

Hope in a Changing Climate

In this short film, Professor John D. Liu, founder and director of the Environmental Education Media Project, explores the remarkable restoration of the Loess Plateau in China. Fewer than 20 years ago, the lush greenery that had once sustained the community's livelihoods – and formed a central part of the area ecosystem – was gone as a result of resource exploitation and natural causes such as depletion from animal overgrazing, etc. A reconstruction project for the Loess Plateau brought in local farmers as decision makers, builders of the landscape re-design, and benefactors of its results, and today the region has returned to its natural state of foliage.

For more information, visit: <http://eempc.org/film-channel/2009/12/10/hope-in-a-changing-climate.html>



Online

Climate Prep

WWF's *Climate Prep* blog covers climate change adaptation and provides a wealth of information on global efforts to prepare and take action to reduce vulnerability to those changes, both by minimizing risks and enabling systems to become more resilient. It aims to “define climate change adaptation through illustrations of on the ground adaptation projects and scientific adaptation studies, explorations of adaptation concepts, and tracking firsthand the progress of adaptation in the international policy arena.” The blog cover themes such as disaster risk reduction, capacity building, community responses, and ecosystems and species.

For more information, visit: www.climateprep.org





Recent & Upcoming Events



STOCKHOLM

UPCOMING EVENTS

World Water Week

August 21-27, 2011 – Stockholm, Sweden

Stockholm International Water Institute (SIWI) has chosen “Water in an Urbanizing World” as the theme for this year’s World Water Week. The event features workshops, seminars, and side events on many water-related issues. World Water Week in Stockholm promotes a global perspective, but with a regard for differences and similarities between regions of the world, phases of development, political systems, and climatic conditions.

<http://www.worldwaterweek.org/>

Sustaining the Blue Planet: Global Water Education Conference

September 13-16 – Bozeman, MT

The Project WET, 2011 Foundation is holding the Sustaining the Blue Planet conference to focus exclusively on water education and its role in solving the world’s pressing water issues. Sustaining the Blue Planet will offer a full array of speakers, the anticipated launch of Project WET’s Curriculum & Activity Guide 2.0, pre- and post-conference workshops, pre-conference field experiences and dedicated networking opportunities.

<http://events.r20.constantcontact.com/register/event?oeidk=a07e317dzobbd64a500&llr=68kelrcab>

International Groundwater Conference

September 19-21, 2011 – Pretoria, South Africa

Our challenges for managing groundwater as a resource are becoming more complex. Globally, the rate of pumping has doubled in the last few decades, and the signs of overdraft and degradation are already visible in many parts of the world. The Ground Water Division of South Africa, in association with the International Association of Hydrogeologists, will offer pre-conference workshops, technical paper presentations, poster and technical sessions, exhibitions, and local tours of technical interest.

<http://gwd.org.za/gwc2011/home>

Call for Papers: IWA World Congress on Water, Climate, and Energy

May 13-18, 2012 – Dublin, Ireland

Climate change is forcing us to reassess our energy usage and will have real, substantial impacts on the water cycle as well as energy production. Solving the interlinked challenges of water, climate, and energy in a sustainable manner is one of the fundamental goals of this generation. Congress will explore topics of resilient and sustainable cities with a focus on climate change adaptation and mitigation.

www.iwa-wcedublin.org