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RESEARCH Update

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# When "Conservation" Leads to Land Degradation: Lessons from Ban Lak Sip, Laos

Land degradation is usually associated with land use practices. However, the choice of those practices is often influenced by factors outside the spatial confines of the farm or village. By examining land degradation problems through a multiple-scale approach, it is possible to better understand the interconnections and drivers. Such knowledge can be used to inform policies to reverse degradation and help ensure that new policies do not have unintended consequences.

In Ban Lak Sip village in the uplands of the Luang Prabang Province in Laos, land degradation appears to have increased substantially in the last 25 years. A recent IWMI study suggests that while the primary causes of land degradation in the village are current agronomic practices, the ultimate causes are related in large part to changes in government settlement and land use policies. Ironically, although these policies aim to protect the environment and conserve land resources, they have artificially decreased agricultural land availability and increased population density, without providing compensatory resources or alternative livelihood opportunities. Farmers have responded by reducing the fallow period and intensifying labour use—undermining the long-term viability of the resource base.

The study conducted by Guillaume Lestrelin, Mark Giordano and Bounmy Keohavong used an integrated approach to examine the physical, economic and social environments in Ban Lak Sip. It has come up with findings that have significant implications for environmental research and policymaking.

Ban Lak Sip, March 2003. The hills above the village constitute the southern edge of the Ban Lak Sip territory.

Ban Lak Sip (literally "kilometer-10 village") is located at the 10 kilometer marker along the national road No: 13 linking Vientiane to the northern provinces. The village occupies an area of some 400 hectares and has a population of around 500. One catchment of the mountainous village is a study site of the Managing Soil Erosion Consortium (MSEC), a multi-country collaborative effort to better understand land degradation and potential solutions in upland areas of Southeast Asia.

Residents of Ban Lak Sip are involved in a variety of on-farm livelihood activities, though annual cropping—in particular upland rice production—constitutes the single most important livelihood activity for virtually all village households. In addition, vegetable production based

Continued on page 2 ➤

# IWRM in Informal Economies

Water management in rural Africa has traditionally been structured by, and around, the local community. This approach, evolved over centuries of practice, has proven to be advantageous to local communities. Local community-based water arrangements tend to be robust and flexible, adapting to population growth and often acting as a safety net for marginalized members of the community, such as people with HIV/AIDS. Moreover, while flaws do exist in traditional systems—for example, abuse of power by traditional leadership structures—these arrangements represent the community's consensus on the use of sharing water for domestic use, irrigation, livestock, business and ceremonial uses.

In recent years, many countries have adopted an Integrated Water Resources Management (IWRM) approach, attempting to replace traditional arrangements with statutory reforms. The IWRM approach differs from country to country, but tends to be highly formalized, especially in comparison to the older, orally-transmitted informal arrangements. Some common features of the new approach include centralized registration, water permits and fee payments. Not surprisingly, this has met with resistance and incomprehension in communities used to more informal arrangements. IWRM is geared to handle large-scale urban or industrial water usage, so its application in informal, rural economies results in paradoxical outcomes.

A case in point is that of Zimbabwe, which passed the Water Act of 1998 entirely ignoring customary law and practice among rural communities; practices that nonetheless continued regardless of the new water

Continued on page 3 ➤

## Workshop on African Water Laws

Over sixty lawyers, water resource policymakers and managers, NGO representatives, and academics participated in the international workshop, "African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa", held in South Africa this year. The workshop discussed research findings on local community-based arrangements for developing and managing water for small-scale domestic and productive uses in rural Africa and the impacts of recent statutory water reforms.

The participants concluded that the ongoing Integrated Water Resources Management (IWRM) statutory water reform in many African countries works to undermine informal water arrangements without introducing practical alternative structures.

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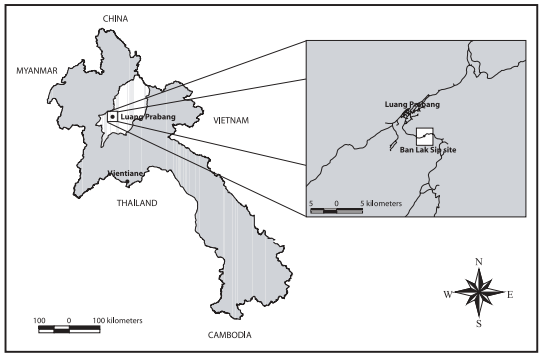
# When "Conservation" Leads to Land Degradation:...

**Figure 1: Site location of Ban Lak Sip village**




on a continuous cultivation system, fuelwood and forest product collection (e.g., mushrooms and bamboo shoots), livestock farming and perennial tree plantations also form important livelihood activities. Almost a third of all activities carried out by an average household are concentrated in the high elevation steep slope zones. Such areas account for the majority of all annual crop production, the mainstay of Ban Lak Sip's still largely self-sufficient food production system.

## Changes in Farming Practices

The IWMI study notes that annual cropping has become increasingly widespread since 1995 and now engages virtually all village households. Likewise, livestock farming has expanded since 1970 as has plantation production (mostly teak and banana). Vegetable cropping has also increased sharply since 1995. More generally, the village community has shifted from relative household production specialization to diversification, by increasing the number of activities in which an average household is involved. People have also increased the cultivated area and the amount of time spent on production activities.

The study notes that a critical factor in land degradation has been the change in farming practices, in particular the intensification of land and labor use in upland cropping as evidenced in a shortened fallow period, lengthened cropping period, increased labor input per land unit, and increasing frequency of tillage and weeding operations. Since 1970, fallow periods have declined by almost two thirds and the cropping period (the number of years a field is cropped before being fallowed) has nearly doubled.

There is strong evidence that the intensification of labor and land use documented in Ban Lak Sip precipitated a chain of events leading to both land degradation and a decline in farmers' working conditions. Experiments by the MSEC in the Houay Pano catchment and elsewhere show that the shortening of the fallow period causes a series of problems, including a weak regeneration of vegetative cover during the fallow period, increases in the potential for runoff erosion, and a reduction of the biomass available for burning activities to replenish soil nutrients and organic carbon.

## Policy and its Impacts

Ban Lak Sip was formally created with the relocation of five neighboring villages after the 1975 revolution, when population resettlement policies were introduced. The Government of Laos has continued to follow a policy of resettling of highland populations to "focal zones" such as roadsides, river bottoms and other more accessible areas where services are easier to provide and to facilitate integration of populations into markets. Ban Lak Sip's location along a major road and near an urban centre made the village an ideal candidate to receive new residents. Since 1975, the village has undergone three main immigration phases.

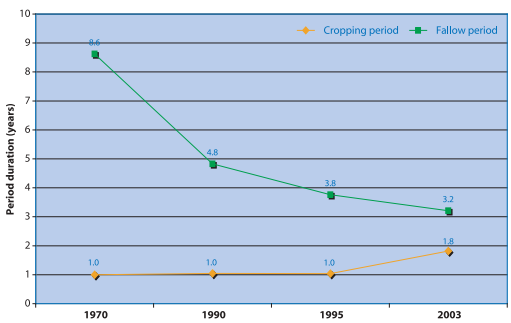
In addition to resettlement schemes, the government has also attempted to eradicate shifting cultivation under the rationale that the practice is a major cause of deforestation and land degradation. In fact, the New Economic Mechanism (1986) emphasized that one stage of transition from subsistence to market economy is the abandonment of slash and burn practices in exchange for stable and market-oriented agriculture. More recent government policy has continued to reaffirm the "sedentarization" of farmers as a key development priority. This is also reflected in the national Land Use Planning and Land Allocation program (LUPLA), which has been in operation since 1989.

In Ban Lak Sip, the land allocation program has resulted in an area of 136 hectares (31% of the village land) being set aside for agriculture. Protected areas and production forests were set at 281 hectares (65% of village land) and the remaining 16 hectares were devoted to housing. While the land reclassification program largely succeeded in its goal to preserve forest cover on a major part of the village land, a secondary effect was a sudden and substantial reduction in available agricultural land.

The combined effect of the resettlement policy, land reclassification and "natural" population growth has been a marked decrease in per capita arable land availability—a 10 fold increase in population density per unit of agricultural land over the last quarter century. Of the three factors, resettlement was the dominant source of change before 1995. Thereafter, land use reclassification became the dominant factor, causing almost the same reduction in per capita arable land availability in one year that natural population growth and resettlements did in ten years.

In the critical upland area—the zone most impacted by land reclassification—the ban on the use of forest areas caused a decrease in the extent of farming activities and hence might have decreased land use intensity and land degradation pressure in the area of primary concern. However, the reduction in the area available to farming along with growing food demand has translated into increased land use intensity on the remaining areas not included in the protected zones. This, in turn, appears to have led to continued pressure on yields addressed through added labor inputs, especially additional weeding, resulting in high rates of erosion localized in the remaining cropped area.

**Figure 2: Average fallow and cropping periods for the fields under annual crops, 1970-2003**




*Source*: Authors' survey

## Conclusions

The results present a number of implications for environmental research and policymaking. First, they suggest that developing a comprehensive understanding of land degradation issues is possible only by looking beyond the proximate, technical dimensions of land use. By contextualizing socio-environmental interactions at various scales, it is possible to better understand the connections between particular local issues and the wider institutional context in which they take place. This knowledge is essential to identify the social, structural causes of land degradation and can help inform policies for reversing degradation or ensure that new policies do not have unintended consequences.

Second, the results suggest that the application of a policy which

Continued on page 3 ➤

uses constraint to drive change should also be complemented by opportunity. For the farmers in Ban Lak Sip, the removal of livelihood options (e.g., some land uses) has not been accompanied by significant new opportunities, leaving the population with few short-term options but to use their remaining environmental resources more intensively and to increase labor input. Understanding how such opportunities can be facilitated, for example, through increased education, improved transport networks or market development consistent with Laos' now more open economic environment, may also provide relief.

Accordingly, consultation and preliminary experimentation should represent an essential step in policy formulation. Acknowledging the rationality of the local livelihood systems and, more generally, taking into account local knowledge may help identify potential problems and socially-acceptable solutions and, hence, contribute to reducing negative consequences.

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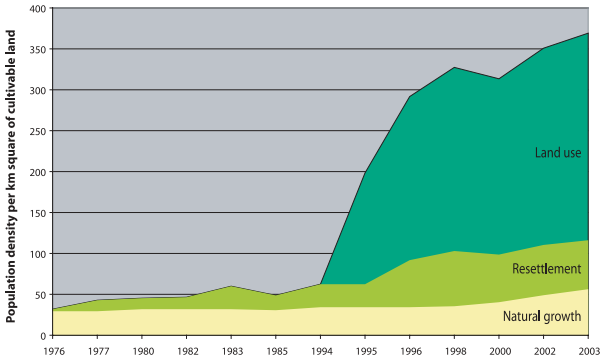
**Figure 3. Natural population growth, resettlement and land reclassification impacts on population density per km square of effective arable land, 1976-2003**




*Source:* Authors' survey

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# IWRM in Informal Economies...

management institutions established by the Act. At a series of consultative water allocation workshops organized by the Mazowe Catchment Council, the conflict between the traditional and modern, the centralized and the localized community approach came out in a dialogue between representatives of the newer water management institutions and headmen and villagers practicing traditional water arrangements. It was evident that not only were the latter sidelined in the formal water reform process up to then, but that they found it difficult to even *conceptualize* either the need for, or the process of, those reforms, let alone the intricacies of its process. As one participant said, *"We are wasting our time discussing what should happen tomorrow when we have nothing and are unlikely to see those plans materializing. This is like buying a maternity dress for a woman who is not yet pregnant. You should build dams in rural areas first before you can talk about water allocation."*

One of the most contentious issues in IWRM in African informal economies is the notion of water as an economic good, and the "user pays" principle–the consequent levying of fees for both direct water services as well as for water resources management services at the basin and national levels. Communities that have never had to pay for what they consider their own water find this an alien concept, especially in instances when their money is not spent to improve their everyday lives in any visible way, or when the money "vanishes" into the bureaucracy. Often, the conflict and confusion run deeper than the question of money. Traditional communities tend to view their water, as they do their land, as part of their ancestral spiritual inheritance. Meanwhile, the logistics of collecting water fees from remote, scattered, illiterate small-scale users without bank accounts outweigh any revenue for a government. In effect, many governments are discovering that methods and institutions which work with large-scale, registered, formal users cannot simply be imposed on their rural counterparts.

Smallholder in the Grootfontein irrigation scheme in the Olifants basin

Many of these issues were highlighted at the international workshop on "African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa" held this year in Johannesberg. It was co-organized by the International Water Management Institute (IWMI), the Natural Resources Institute (NRI) UK, Faculty of Law, University of Dar-es-Salaam, Tanzania, and the Department of Water Affairs and Forestry (DWAF), South Africa. Among the participants were lawyers, water resource policymakers and managers, NGO representatives and academics from twelve African states and Asian and Latin American countries.

The workshop discussed research on local community-based water arrangements and the impact of recent statutory water reform, comparing findings in rural Africa to similar experiences in Asia and Latin America. It concluded with a set of recommendations for African governments, international financing institutions and funders. The Plenary Statement points out that recognizing and supporting community-based water arrangements through financial and technical support would help achieve the Millennium Development Goals of halving the number of people without access to safe drinking water and sanitation by 2015.

Delegates agreed that the primary need of rural communities is water development, not regulation. Thus in designing regulatory administrative water rights systems, community-based water arrangements should be recognized as equal to statutory rights, as far as they progressively comply with constitutional imperatives and principles of human rights. Ill-planned regulatory reforms run the risk of entangling users–especially the poor–in unrealistic and burdensome administrative and bureaucratic obligations, in addition to being logistically cumbersome and difficult to enforce. Moreover, they complicate rather than solve localized conflicts over scarce water resources during the dry season.

Policy recommendations targeted at these goals suggest raising the thresholds of small-scale water uses below which water use is authorized without registration. Further recommendations include devolving water management authority to the lowest appropriate level; including collective local community-based arrangements when establishing basin management institutions; and ensuring that new water bureaucracies build on informal community arrangements to remain small, cost-effective and focused on pro-poor socioeconomic development. The workshop's perspective is perhaps best captured by the recommendation to "test the logistic requirements, implementability and enforceability of draft legislation on the ground before adoption."

## Related reading:


- The *Plenary Statement of Participants at the African Water Laws Workshop* and the 33 workshop papers can be downloaded from: www.nri.org/waterlaw/workshop
- Claudious Chikozho and Jim Latham, *Shona customary practices in the context of water sector reforms in Zimbabwe*
- Van Koppen, B.; Sokile, C.S.; Hatibu, N.; Lankford, B.A.; Mahoo, H.; Yanda, P.Z. 2004. *Formal water rights in Tanzania: Deepening the dichotomy?* IWMI Working Paper 71. Colombo, Sri Lanka: International Water Management Institute

## Assisting Tsunami Recovery Efforts in Sri Lanka

Sri Lanka is one of the countries affected by the Indian Ocean Tsunami of December 26, 2004. In certain areas of the island, the waves measured more than 10m high and penetrated as much as 1.5 km inland, causing unprecedented death and devastation. Official estimates have confirmed that more than half a million people have lost their homes, while over 30,000 people lost their lives.

IWMI responded to the tragedy by assisting in the relief and rehabilitation efforts of the Government of Sri Lanka as well as local and international relief organizations. IWMI's assistance included immediate relief operations by way of supply missions, the launch of a CG system-wide appeal to raise money for disaster relief, and the provision of GIS mapping support to the Sri Lankan government on tsunami affected areas.

The funds raised through the IWMI Tsunami Appeal Fund have been allocated to three main relief and rehabilitation activities in Sri Lanka: agriculture-related livelihoods in the Hambantota District; reef clean up activities of IUCN Sri Lanka and Sub Aqua Club; and the rehabilitation of a tsunami affected village by the Kalametiya Rehabilitation and Development Trust.

IWMI also conducted several studies on the effects of the tsunami on the environment, natural resources and the livelihoods of communities in the affected coastal regions of Sri Lanka.

This Research Update highlights two of IWMI's initiatives: the post-tsunami livelihoods needs assessment of the Hambantota District in the south and research related to the tsunami impacts on drinking water in the east coast.

# Post-Tsunami Livelihoods Needs Assessment of the Hambantota District in Southern Sri Lanka

Despite quick mobilization by the government and other agencies to meet the immediate needs of affected communities, there is still a crucial need to examine the longer-term implications of the disaster. IWMI's contribution here was a rapid appraisal of both direct and indirect impacts—and their implications—on livelihood systems in the Hambantota district of Sri Lanka. The study also considered how livelihoods could be restored and social and environmental resilience to future disasters could be built. This and future work will contribute towards enabling communities to better cope with natural disasters or other such calamities.

### Livelihoods and Poverty

Hambantota district on the southern coast of Sri Lanka was one of the many areas devastated by the tsunami. As the third poorest district in the country, it is likely to feel long-term impacts of the tsunami on its economy and in people's livelihoods. As many as 16,994 families were affected, with 3,000 deaths and partial or complete destruction of 4,000 houses (DDMC 2005).

Livelihood activities in the district include agriculture, fisheries and services. Agriculture, the main source of income, is dominated by smallholder production systems and irrigated agriculture. Hambantota's 25,182 ha of irrigated land account for 6 percent of the total irrigated area of the country. The district also accounts for 5.5 percent of the nation's fishing fleet and for 12.9 percent (34,470 tons) of the total marine fish production (MFOR 2005). Formal industrial activities are of less importance, employing only 0.3 percent of the national workforce. However, statistics indicate the involvement of many people in the nonformal manufacturing sector, including coir processing and curd production (DCS 2003). Services and trade, particularly connected to tourism, are important as well, because the district's beautiful beaches, and Kataragama—one of the country's most important pilgrim destinations—draw local and foreign tourists in large numbers.

### Understanding the Impacts

All types of agriculture in the area were affected. Increased salinity was a problem for all farmed land, while lowland farmers experienced siltation of drainage channels, and agricultural equipment, such as water pumps, were damaged or destroyed. A range of crops including coconut, paddy and vegetables were destroyed or damaged in lowland areas and homestead gardens. The impact on homestead gardens, which also suffered erosion, is important because they often meet many of the household food requirements and can also provide extra income. Livestock rearing, which is an important activity in Hambantota—the country's main curd producing district—was also impacted through loss of cattle and the early weaning, which resulted when the shock caused cows to stop producing milk.

The marine fisheries sector was arguably the worst affected, with damage to vessels, landing points and fishing gear. The coir industry has also been badly hit both through the loss of coconut trees for coir supplies and physical assets, such as soaking pits and rope making machines. The sea salt industry, by contrast, does not appear to be badly affected because salt production does not begin until July. The only impact appears to be people's perceptions that the salt is polluted and this is likely to be effectively addressed through an awareness campaign.

### Restoring Livelihoods and Building Resilience

IWMI's livelihood assessment suggests strategies to restore livelihoods and build resilience to future shocks. It does not provide all the answers but highlights the areas that need to be

IWMI staff gathering data on tsunami damage to Hambantota's coastal eco-system

addressed, raising questions that must be answered if livelihood options are to be effective and sustainable.

For many people's livelihoods, the medium-term solution is to provide the physical assets. In coir production, for example, soaking pits and rope machines must be replaced, either by the owners themselves, through diversion of household funds or by aid agencies. Rehabilitation of the fisheries sector will require considerable physical inputs, including replacement of boats, fishing gear and larger infrastructure such as harbours. Although these measures were part of the early relief effort, lack of assessment led to the provision of inappropriate gear as well as a disproportionate increase in coastal fishing boats, which is likely to strain already depleted stocks. Ancillary industries, such as fish processing, and ice production must also be restored, and this is an opportunity to reduce waste and increase productivity on multi-day boats.

The tourist industry is a major source of external income and regenerating it will require a combination of infrastructure development and awareness raising to promote local tourism. Linked to this should be efforts to make tourism more sustainable and locally beneficial.

The rehabilitation of natural resources for some livelihood activities is required. In the agricultural sector, a large part of the affected irrigated low land has already undergone remedial measures through special irrigation releases, while rehabilitation methods for the remaining farmed area should be decided upon by evaluating the economics of reclamation. The study recommends the long-term monitoring of the recovery of agricultural land.

The salinity levels in homestead gardens are likely to decline in the next wet season but the fruit and coconut trees will need to be replaced and funds provided in the medium-term to compensate for the loss of homestead production. Agricultural production in the dry zone is, however, always problematic and farmers need for example to be encouraged to grow crops that have lower water requirements. This has been the intention of the Irrigation Department for some time but has for various reasons[1] not been successfully adopted by farmers. The study suggests that tsunami relief funds be utilized to identify farmers' needs; understand farmers' reluctance to diversify and grow lower water demanding crops; to provide awareness about crop types, agricultural needs and markets; to support farmers who are prepared to try alternatives; and to fund the stimulation of markets. Such research could help tackle the underlying problems of agricultural production in the dry zone.

The study also notes that this might be an opportune moment to address the district's water shortages. Water use could be reduced through improved efficiency, rainwater harvesting, and the use of wastewater. Water shortages are also linked to water sharing, an issue that needs to be urgently addressed in the area. This could be achieved by strengthening farmers' associations and irrigation committees, and improving physical infrastructure and overall water availability. In the short-term, however, farmers, fishermen and many other livelihoods groups are without a source of income, so it may be appropriate to use tsunami relief money to pay for local labor for community projects to restore community infrastructure, common land and wetlands. This has already been initiated in some areas, and provides the benefit of physical improvement to the area and a means to distribute aid money fairly. It should not, however, be the only means of distributing aid as some of those most in need may be unable to work.

Tsunami survivors from Kalametiya village

With the disruption to livelihoods, many households have had to change their livelihood activities, adopting short-term coping strategies. For some, social capital has been one of the most important assets since the tsunami, but there has also been considerable tension, particularly over resource allocation, and where households need to be relocated. In general, however, people have relied on their social capital–family, friends and community groups–as a major part of their coping strategy. While some community groups have been highly effective, others have been constrained by lack of funds, poor management and internal conflict. IWMI's study highlights the importance of supporting these community initiatives, for example, by providing conflict resolution, management and financial training.

Access to financial capital has also been critical as several households in the costal area have lost their means of income generation. Many have had to fall back on savings and borrowing money from formal or informal sources to survive without an income and to purchase assets, such as buildings, boats, fishing gear, livestock and tradable goods. Credit on reasonable terms and revolving funds for community groups, such as farmers' organizations, fishermen's associations and women's groups, will be crucial in the coming months. In order to circumvent the problem of future debt, however, households must be made more resilient through livelihoods diversification, improved access to markets and adequate availability of water. These issues urgently need to be researched and addressed.

## Collaboration, Communication and Action

Though many people are still struggling to cope with the tsunami's legacy of death, destruction and displacement, the national and international response to the tsunami has provided an opportunity to develop more sustainable and diverse livelihoods that contribute to reducing vulnerability. This can happen through long-term partnerships, particularly with community members and organizations. Only through a collaborative approach will there be any effective up-take and sustainability, leading to long-term resilience.

*For further information on IWMI's post-tsunami research, contact Sarath Abayawardana, s.abayawardana@cgiar.org*

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[1]These include risk, apparent lack of markets and the time commitment for growing such crops.

# Tsunami Impacts on Drinking Water on the East Coast of Sri Lanka

With the tsunami, thousands of families in the coastal areas of Sri Lanka lost their source of drinking water overnight. Their household wells were destroyed—contaminated by seawater and debris—and pipelines from more central supplies were broken. Effective immediate relief efforts ensured that no one suffered from lack of safe drinking water, and no outbreaks of disease occurred. Water has been delivered to the local communities by trucks, and wells have been rehabilitated in an attempt to restore the previous water supply system.

IWMI is involved in a project aimed at supporting the rehabilitation of the drinking water supply from wells on the East coast. One of the key activities has been to give NGOs and authorities technical advice on how best to clean the affected wells. This is not a straightforward task because too much cleaning and pumping of the wells may, in fact, *increase* the problem of saltwater in the wells. Yet another concern is that the cleaning method that was appropriate just after the tsunami is no longer recommendable. Hence, general awareness raising and information dissemination of the impacts of the tsunami on wells and the groundwater table and the functioning of the groundwater in general have all been important components of this project.

Furthermore, a monitoring scheme has been initiated to assess the impacts on drinking water, and come up with recommendations of how to revert to the pre-tsunami conditions or how to take remedial actions where necessary. About 120 wells in three selected areas in Batticaloa and Ampara districts (Kallady, Kaluthavalai and Oluvil) have been tested for salinity and other water quality parameters to observe the reduction in salinity as a result of the natural flushing of the wells and the groundwater due to rainfall. The results show that salinity is also influenced by the various levels of pumping and the depth of the wells. Hence, the project also aims to identify potential risk areas or risk behavior, in terms of how well use can deteriorate rather than improve the quality of water. This will result in a new set of recommendations that will guide the optimal and sustainable use of the wells and support the re-establishment of a safe and adequate water supply for these communities. The project is funded by CARE and is implemented in collaboration with the Eastern University of Sri Lanka and the Water Resources Board.

Testing wells for excessive salt after the tsunami in Kalmunai on the East Coast of Sri Lanka

Finally, to bridge the relief work with more long-term planning of the water supply in these areas, a Ph.D. project is being initiated in collaboration with Copenhagen University to look at any longer-term impacts of the tsunami on groundwater in the affected areas. It will also assess the potential of groundwater in coastal areas to meet the growing demand for water.

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# Defining Drought—and Dealing with it

**Drought is perhaps the most complex of natural hazards. Droughts develop slowly, are difficult to detect, and are multifaceted—even in a single region. Thus, definitions of drought tend to vary from region to region, and are often based on dominant perceptions and the task for which it is defined. This makes effective drought responses especially difficult.**

Achieving a common conceptual understanding of a drought is both possible and necessary. Drought definitions are important in determining drought policies and actions—and ensuring that authorities and agencies make the right decisions and take the right action.

Drought is often generally defined as a temporary and recurring climatic event stemming from the lack of precipitation over an extended period of time. Like all other natural disasters, drought has both physical and social components. If the area affected by drought is not populated, there is no social impact. If communities are "well equipped" to withstand it, then social and economic impacts are not severe.

"The response to drought needs to shift from crisis management to risk management," explains Vladimir Smakhtin, who heads IWMI's project on Drought Assessment and Mitigation in Southwest Asia, "This project is unique because it has brought together for the first time government agencies, research institutes and the NGO sector from three countries. We need to move away from the short-term approach of simply providing relief assistance. The answer lies with better preparedness. This means being able to forecast and monitor droughts as they develop, and having better policies, institutions and tools in place to cope with the effects of drought."

The best time to prepare for drought is the period when there is no drought. However, significant progress in establishing a basic response framework is often accomplished during periods of peak drought severity. The challenge is to transform this framework into a response/mitigation plan—and institutionalize it.

The Drought Assessment and Mitigation Project reviewed the status of drought research and management in southwest Asia—particularly in west India, Pakistan and Afghanistan—and identified the gaps that needed to be addressed. The project developed interim recommendations for improving drought management for regional governments, relief agencies and local communities.

## Vulnerability assessments

Local vulnerability assessments to measure how communities cope with drought were carried out across villages in the most drought-prone areas of the three focus countries. The surveys looked at how people on the ground perceived, and adapted to, recurring water scarcity and at ways of enhancing such adaptation. They

Continued on page 7 ➤

The severity and persistence of droughts in southwest Asia in the recent past has produced a wide range of impacts, but Governments have not always been able to deal with them effectively. The major obstacles have been the absence of reliable data, deficient knowledge sharing, and limited professional capacities. IWMI initiated the Drought Assessment and Mitigation project as a response to this critical need.

**http://dms.iwmi.org**

assessed how effective government and NGO interventions have been and what further interventions would be necessary for effective drought mitigation.

Survey findings revealed that in southwest Asia, where livelihoods of a large strata of population are directly dependent on agriculture, physical water availability and access to reliable water sources are the two fundamental factors influencing the level of poverty in general and the magnitude of detrimental impacts of droughts and responses to drought in particular.

## Drought hazard assessments

District level hazard assessments were conducted to examine the frequency and severity of drought over the past 30 years. The project first identified suitable drought indices, which could be applied consistently over the region. It then examined the ability of drought indices to detect droughts of various duration. Finally, it developed a set of maps, which describe characteristics of drought severity in the region. This gives decision makers the opportunity to place current drought conditions in historical perspective and to prepare appropriate drought management plans.

## Drought monitoring

IWMI researchers developed a near-real time Drought Monitoring System (DMS) using satellite technology. Remote sensing data enable researchers to monitor the progression of droughts based on the status of vegetation on the ground. Reports can be generated at 8-day intervals to provide pin-point accuracy down to an area of a quarter of a square kilometer. The unique feature of this system is that it is linked to two generations of remote sensing data–Moderate Resolution Imaging Spectometer (MODIS) and Advanced Very High Resolution Radiometer (AVHRR)–which have different temporal and spatial resolutions and optical characteristics. The prototype DMS is setup on the Internet: *http://dms.iwmi.org*

## The Way Forward

The project has prepared the groundwork for a longer-term regional initiative linking local and regional efforts in drought management to global networks in climate forecasting and improving disaster management planning and operations. Such a long-term program on drought management would include both technical aspects like measuring and prediction, on the one hand, and developing drought policies, institutions and coping strategies, on the other.

A recently launched website–www.iwmi.cgiar.org/drought assessment/index.asp–is intended to be a portal for drought-related studies, news and information on the southwest Asia region and a meeting place for scientists, managers and policymakers dealing with different aspects of drought.

Some of the project's findings and recommendations with implications for institutional and policy change include the following:

- There is a need for an integrated response to drought, for which local, provincial, federal and regional policies should be made congruent with each other. The challenge is to make drought management more effective within current administrative and governmental systems and to integrate drought preparedness policies with other national plans or strategies like those that aim to ensure food security or sustainable water resources management.
- Appropriate policies that allow effective management and monitoring of groundwater use throughout the region need to be developed. Steps should be taken for the revision and enforcement of water laws and improvement of the overall groundwater governance. This is one of the obvious areas of sharing experiences and coordinating programs between countries.
- The agricultural sector–the most vulnerable to drought–is affected in both rain-fed and irrigated areas. Traditional irrigation systems get completely exhausted during prolonged droughts, and rehabilitation of such systems should be given priority. Government support is imperative, as most farmers cannot afford to rehabilitate these systems themselves. In Pakistan, for example, indigenous methods for the construction and rehabilitation of traditional systems (karezes) are used, but due to continuously declining groundwater tables, these methods are no longer effective. In Baluchistan and Sindh provinces 60 percent of karezes are no longer functional. People need to acquire both the technology and skills to rehabilitate these irrigation systems.
- The accuracy of drought prediction in South Asia must be increased. This means that droughts can be predicted a month in advance in any corner of the region and be delineated more precisely. To achieve this, it is necessary to link remote sensing data with medium-term weather forecasting and to increase the accuracy of these forecasts.
- Addressing data collection and sharing issues requires innovative approaches for resource allocation, backed by political commitment. This is especially important in South Asia where the spatial and temporal climatic variability is high, but observation networks are sparse. In general, without improved data availability, access, and timely delivery mechanisms, very limited success can be achieved in drought preparedness.

http://dms.iwmi.org

Most South Asian countries are regularly affected by severe and often multi-year droughts. The droughts of 1999-2002 affected more than 100 million people in the region. Severe impacts were felt in Gujarat and Rajasthan states in India, Pakistan's Sindh and Baluchistan provinces, as well as extensive areas in Iran and Afghanistan.

In many parts of the region, there is widespread scarcity of potable water as well as depleted supplies for irrigation and industry. Agricultural production has been severely affected, and there has been a significant reduction in livestock populations that are the mainstay of subsistence livelihoods.

## Related reading


- Thenkabail P.S., Gamage, M.S.D.N. And Smakhtin V.U. 2004. *The Use of Remote Sensing Data for Drought Assessment and Monitoring in South West Asia.* Research Report 85. Colombo, Sri Lanka: International Water Management Institute.
- Smakhtin, V. U. and Hughes, D.A. 2004. *Review, Automated Estimation and Analyses of Drought Indices in South Asia.* Working Paper 83. Colombo, Sri Lanka: International Water Management Institute.


All project publications are available on the project web site: http://www.iwmi.cgiar.org/droughtassessment/index.asp

# Water Policy Briefings

IWMI collaborated with the Global Water Partnership (GWP) in the production of the two most recent Water Policy Briefings. WPB issue No:12 focuses on integrating fisheries into irrigation planning and management while issue No: 13 looks at ways of reducing poverty through integrated management of groundwater and surface water.

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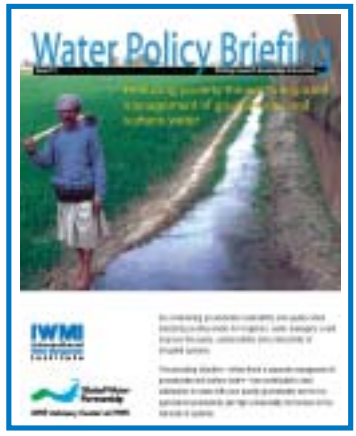


# Recent Publications

For on-line access to IWMI Research Reports and Working Papers, see www.iwmi.org/pubs

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**Smakhtin, Vladimir U.; Shilpakar, R. L.** 2005. *Planning for environmental water allocations: An example of hydrology-based assessment in the East Rapti River, Nepal.* Colombo, Sri Lanka: IWMI. v, 20p. (IWMI Research Report 89)

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**Svendsen, Mark.** (Ed.) 2005. *Irrigation and river basin management: Options for governance and institutions.* Wallingford, UK; Colombo, Sri Lanka: CABI; IWMI. xii, 258p.

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