Water Matters

News of IWMI research in Sri Lanka

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This inaugural issue of "Water Matters" focuses on some of the work that IWMI has carried out in Sri Lanka from 1986 to date, and tries to capture the rationale for its evolving program.

IWMI
International Water Management Institute

IWMI in Sri Lanka
Research in our Host Country

This inaugural issue of "Water Matters" focuses on some of the work that IWMI has carried out in Sri Lanka over the years, and tries to capture the rationale for its evolving program.

Early work in Sri Lanka was mainly focused on irrigation water management. Canal irrigation management and crop diversification in Mahaweli system H and the Devahuwa scheme, and in the Uda Walawe and Kirindi Oya schemes were some of the main projects. IWMI worked very closely with Sri Lanka Irrigation Department and the Mahaweli Authority during project implementation and was able to make significant contributions.

Since the mid 1990's, with the focus shifting to land and water management in river basin contexts, IWMI work began to cover broader aspects such as 'agricultural impacts on wetlands', 'irrigation investments and poverty' and 'water and health issues'. Some of the bigger projects such as the "Walawe basin synthesis" under the Comprehensive Assessment program, and "Expansion without extinction", studying agricultural expansion and biodiversity issues are drawing to a close. The first phase of the project on "water-poverty mapping", aimed at understanding the spatial distribution of poverty, causes and links with water, at the smallest possible administrative division (GN) level, is similarly drawing to a close, but this perhaps is the beginning of a longer term program.

Some of the more recent projects include a "Knowledge Base System (KBS) for drought preparedness" aimed at developing RS/GIS techniques for improved disaster preparedness, "Mitigation of diffused pollution", "Climate variability and malaria transmission" and "Wetlands mapping and database", signifying the shift of IWMI's work to cover a broader spectrum of water related issues.

The main story in this issue analyses this shift and draws a parallel between the evolution of research activity in Sri Lanka with that of IWMI's evolution in terms of project scope and content and illustrates the shift of IWMI's thinking from field/scheme level irrigation studies to basin level water, environment and livelihood issues.

The continuing research strategy in Sri Lanka is centered around two needs; studies that generate generic solutions of global importance and applicability, and those that are important in the context of national importance, visibility and impact. Within this, the bulk of the activities are expected to focus on the Ruhuna Benchmark Basins - one of IWMI's original benchmark basins - and through that, help operationalize the Benchmark Basin concept as a key IWMI strategy.

The '2004 tsunami' has also provided an opportunity to contribute in terms of research based inputs for longer term rehabilitation and a number of activities have been or are being pursued for collaborative work and funding opportunities. Ongoing peace initiatives in the country and the likelihood for increased rehabilitation work of the north-east will also be a contributory factor in shaping the Sri Lanka program.

As is the case for all IWMI activities, consultations and partnerships form the core of the mechanism through which research is planned, prioritized, and implemented. Apart from regular contact and interaction with the authorities, the primary process through which nationally important issues are discussed remains the Sri Lanka Consultative Committee which is the forum for interaction with the highest level policy makers in the government. Knowledge sharing and capacity building in this process are of quite some value and fulfil part of IWMI's mandate. The interview featured in the inside back page of this issue - how the perspectives of a hardcore electrical engineer changed after contact with IWMI - is just one such instance of how IWMI directly and indirectly contributes to capacity building.

Dr. Sarath Abayawardana - Head, Sri Lanka Program

Putting Poverty on the Map:

IWMI's Water-Poverty Mapping Work

Compiled by Sonali Senaratna Sellamuttu

Poverty is a phenomenon that affects a majority of the world's population. Poverty reduction is therefore of critical importance in the world development agenda. In Sri Lanka, as in many other developing countries, accurately identifying and locating the poor are two critical issues poverty alleviation programmes need to address. National poverty assessments in Sri Lanka are compiled for large geographic administrative units such as the district level. At this level,, it is not possible to identify the spatial patterns of poverty within and across districts, which could therefore hide important differences that exist between areas. In recent times there has been a growing need for poverty information at a finer resolution, which would allow for the better geographic targeting of poor households (Hyman et al., 2005; World Bank, 2006).

To address this need, a water-poverty mapping exercise was carried out by IWMI using poverty related statistics at a lower administrative unit -the Divisional Secretariat (DS) level - to investigate where the poor in Sri Lanka were clustered spatially and in addition, to determine the links between access and availability of water, land resources and infrastructural facilities with the spatial clustering of poverty at the DS level. In this study, seasonal rainfall was used as a proxy variable for water availability, while the availability of irrigation infrastructure in major and minor irrigation schemes was taken as a proxy for access to a water supply. Other proxies were also used in the case of the land availability, employment and infrastructural facilities (Amarasinghe et al., 2005a).

The results of the mapping exercise clearly showed significant spatial variation of poverty across DS divisions. Findings suggested that the disaggregated poverty maps could be a valuable tool in the geographic targeting of poverty alleviation interventions. For example, in the case of Samurdhi, the Government welfare programme to assist household's move above the national poverty line, these poverty maps could be used to ensure that financial aid was distributed in an equitable manner at the DS level (Amarasinghe et al., 2005a).

The poverty maps also showed significant spatial clustering of poor and non-poor areas. In four rural districts where agriculture was the main livelihood activity in a majority of households, a high percentage of poor households were apparent, whereas around major urban centres, the opposite was observed and there was a clustering of DS divisions with a low percentage of poor households. This according to Amarasinghe et al (2005b) suggested that in predominantly agricultural areas, the poor were only presented with limited economic opportunities to escape poverty.

Another important finding highlighted by this work was that the access to irrigation infrastructure appeared to be a major factor in reducing poverty. It was observed that in rural areas where water was a scarce commodity, the spatial clustering of major and minor irrigated areas and large agricultural holdings were associated with lower spatial clustering of poor households. However, where agricultural small holdings were concentrated the percentage of poor households appeared to be high. The results implied that making major investments in developing new irrigation schemes or rehabilitating existing irrigation schemes may not be an effective intervention on their own in certain areas of high poverty incidence as other factors also played a part in determining poverty incidence (Amarasinghe et al., 2005b).

Access to water is crucial in poverty reduction. Rural women filling water for domestic use in the Walawe basin where IWMI is studying the links between access and avialability of water, land resources and infrastructural facilities.

Overall, the mapping exercise proved to be a useful visual tool to simultaneously display different parameters, in this case poor households and access to water, land and infrastructural facilities. One limitation encountered under this study was that reliable data was not available to measure some of the variables used such as access to resources, markets and services. In addition, some of the proxies used may need to be further refined. Moreover, a more in-depth analysis on the factors causing poverty would be critical in the designing of the most suitable interventions for poverty alleviation (Amarasinghe et al., 2005b). In conclusion, while the water-poverty mapping exercise proved to be a useful tool in identifying where the poor live and in providing some understanding of certain factors that contribute to poverty incidence, to achieve its full potential this tool perhaps should be used not in isolation, but together with other tools used today in poverty analyses exercises. Thereby a more holistic understanding of the different dimensions of poverty may be gained.

References

Amarasinghe, U. A., Samad, M. and Markandu, A (2005a). Locating the poor. Spatially disaggregated poverty maps in Sri Lanka. Research Report 96. International Water Management Institute, Colombo Sri Lanka.

Amarasinghe, U., Samad, M and Markandu, M (2005b). Spatial clustering of rural poverty and food security in Sri Lanka. Food Policy 30:493-509

Hyman, G., Larrea, C. and Farrow, A (2005). Methods, results and policy implications of poverty and food security mapping assessments. Food Policy 30:453-460

World Bank (2006). About poverty maps. Available at www.worldbank.org/poverty

From Irrigation, to Managing Water for Food, Livelihoods, Health and the Environment

The Evolution of IWMI's Research in the Walawe Basin

In the 1980s when IWMI first began research in Sri Lanka, the Walawe basin was where the research program took root. Since then, the program grew in two directions; one addressing thematic issues and the other, spatial issues. Research further developed and expanded in these areas based on lessons learned and experience derived from the different research projects in the Walawe. Theme research expanded in response to the multiple uses of water in the basin and the impact of these uses on the social, economic and physical environment. The development of spatial research was aimed at obtaining a holistic understanding of the basin and the movement of water across different geographical and agro climatic zones within it. Through its thematic and spatial research IWMI was able to arrive at a more integrated and comprehensive understanding of water, its multiple uses in the context of a river basin and its impact on various components of the environment. IWMI's long term research program in the Walawe basin is a classic example of research covering both thematic and spatial directions, expanding and evolving to encompass basin issues from a holistic perspective.

Spatial and Thematic Expansion

Research carried out in the Walawe basin can be grouped into 4 different phases in terms of spatial and thematic expansion over time.

1986-1990 - In the Beginning...Irrigation Water Management on Tertiary Canals

The objective of research in this phase was to help the irrigation management agency, MASL monitor the progress of an ADB funded irrigation rehabilitation project. Research concentrated mainly on agency and farmer behaviors related to water management in the Field Canal and Distributory Canals (tertiary canal system level) at pre-rehabilitation stage. The implications of canal rehabilitation on water management were monitored in the latter stage of this research. A crop diversification program initiated by MASL was also monitored to provide feedback to farmers and agency officers on regular basis.

Under this research, although agronomic, socioeconomic, hydrological and institutional factors relating to agriculture under irrigation did receive attention, the observations were made only at some tertiary level sample locations in the Udawalawe irrigation scheme. The interactive/ interdependent nature of water delivery at different levels of irrigation canals from field canals to main canals were not taken as units of observation.

At the end of this research phase, the need for studying the different hierarchical levels of canals was identified.

1990-1995- Research on Water Management and Crop Diversification in the Uda Walawe Scheme

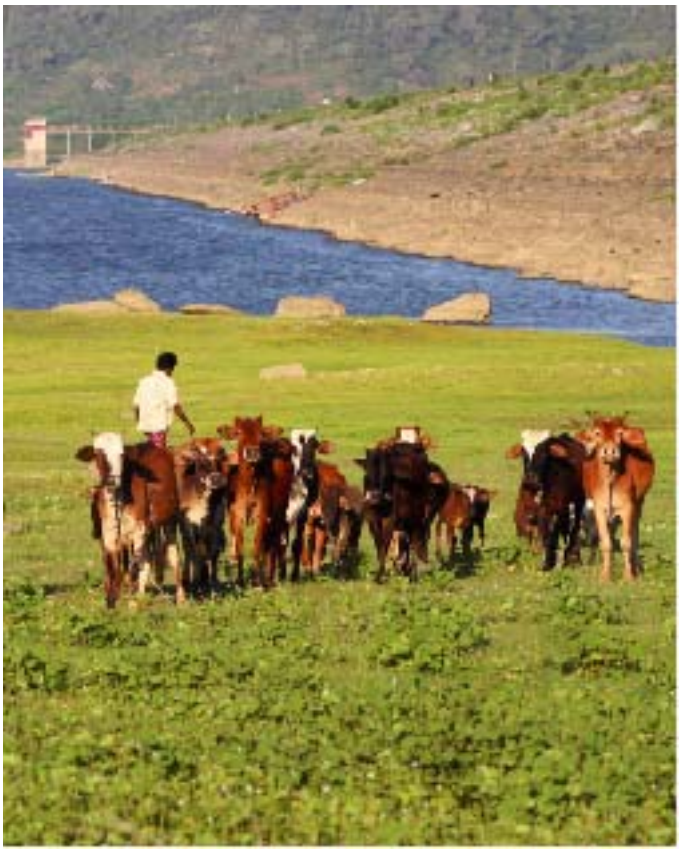
During this period, the ADB funded Irrigation Management and Crop Diversification Project expanded. The project aimed at supporting stakeholders such as MASL staff and Farmer Organizations (FOs) to improve water management practices and motivate them to practice crop diversification in the upstream areas of the Right Bank (RB) system of the Udawalawe scheme. Research concentrated on the tertiary canal system and in some selected samples, secondary canals in upstream parts of the scheme. Both the donor and MASL were satisfied with the geographical units chosen for the study. As in the first phase of the study, the different hierarchical units within the Uda Walawe scheme were not the main focus.

The participation of stakeholders such as MASL and Farmer Organizations was not confined only to providing data and information to researchers. Instead, they themselves were partners in the research process, actively involved in information collection and sharing of data with researchers and colleagues. This "action research" was effective in motivating stakeholders to implement research based recommendations for improving agricultural performance and water management.

1995-2000 - Moving to Research on Multiple Themes

IWMI and its field research team continued to measure water flows in the Udawalawe irrigation Scheme even after the ADB funded Irrigation Management and Crop Diversification Project ended. During this period, IWMI began to look at issues beyond irrigation water management and also beyond the Udawalawe irrigation scheme. An economic assessment of the multiple use of water in this scheme was carried out to demonstrate the significance of irrigation water used directly or indirectly for other livelihood activities. In this study for the first time, the impact of irrigation water on livestock, fisheries and home garden development were evaluated, thereby introducing a new approach for assessing the impacts of irrigation water within an irrigation scheme.

The environmental impacts of irrigation were also looked at during this period under which another thematic research project examining the impact of irrigation on malaria was launched. In the Bundala lagoon area, IWMI researchers were studying the impact of upstream water resources development on the environment downstream of the basin. Now, research was starting to bridge the gaps between agriculture, livelihoods, environment and health issues in a basin, and understand the trade-offs and links.



The Lunugamvehera Reservoir in the South. IWMI carried out studies on anicut irrigation schemes, small tank systems, inland fisheries, livestock and irrigation water use in the Udawlawe irrigation scheme and Walawe Basin.

2000 to 2006 - The Birth of the Benchmark Basin Concept

In the 21st century IWMI introduced the "Benchmark Basin Concept" to evaluate the performance of river basins, and the Walawe basin was one of the basins selected for benchmarking. Water accounting to track the multiple uses of different water sectors was an important tool developed by IWMI in this period. This tool is useful for water

Managers to make decisions on water resources allocation, taking into account the different needs of a system.

IWMI carried out a series of studies on anicut irrigation schemes, small tank systems, inland fisheries, livestock, irrigation water use in the Udawalawe irrigation scheme and Walawe Basin. All these studies helped to form a comprehensive picture of water resources management and development in the Walawe Basin.

Three specific studies relevant to thematic issues were carried out to understand the implication of water resources development on different components of the environment in the Walawe basin. They were:

- **Research on the Impact of Irrigation Development on Biodiversity in the Udawalawe Left Bank Area**

  The left bank area, once under scrub jungle, had been brought under irrigation. Researchers monitored the impact of irrigation on biodiversity and livelihoods, selecting sample areas under different stages of irrigation development, for example pre-development, during development and post-development

- **Impact of Diffuse Agriculture Pollution on Water Quality and Livelihoods**

  This research was carried out in a sub-basin of the Walawe basin, Kachchigala Ara. The main objective of this research was to assess the impact of diffuse agriculture pollution on water and different livelihood activities.

- **Impact of Water Use for Hydro -Power Generation on Irrigated Agriculture**

  Research was carried out on a selected irrigation scheme near a hydro-power generation project located upstream of the Walawe Basin.

IWMI has been able to generate useful knowledge for making rational decisions on water resources development and management in the Walawe and other basins in Sri Lanka and elsewhere through its research in the Walawe basin. This research was based on the principle of "cumulative learning for expansion", which paved the way for a more comprehensive and holistic understanding of water management, and water as a resource moving across different irrigation schemes, and meeting multiple needs such as agriculture, fisheries, livelihoods, industry and domestic needs before flowing into the sea.

Based on a paper by K. Jinapala, P.G. Somaratne and B.R. Ariyaratne: Evolution of IWMI's Research Interventions in Walawe River Basin: Spatial and Thematic Expansion.

IWMI has been carrying out extensive research on water management and crop diversification in the Uda Walawe. This farmer who successfully switched from banana cultivation to passion fruit farming belongs to a network of Farmer Organizations (FOs) operating in the basin.

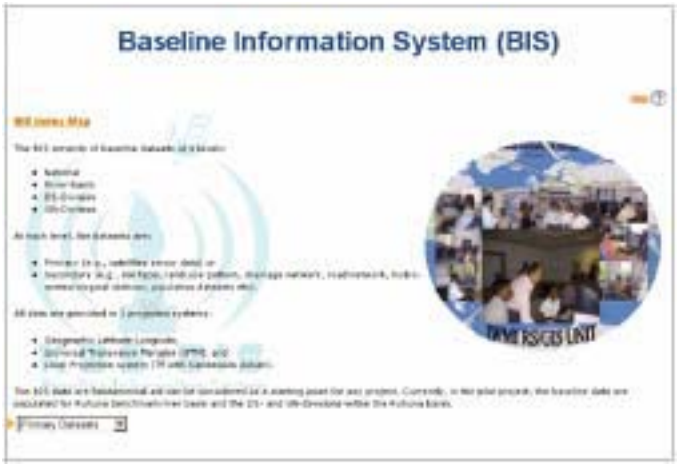
A Knowledge Base System for Sri Lanka (KBS-LANKA) for Disaster Preparedness

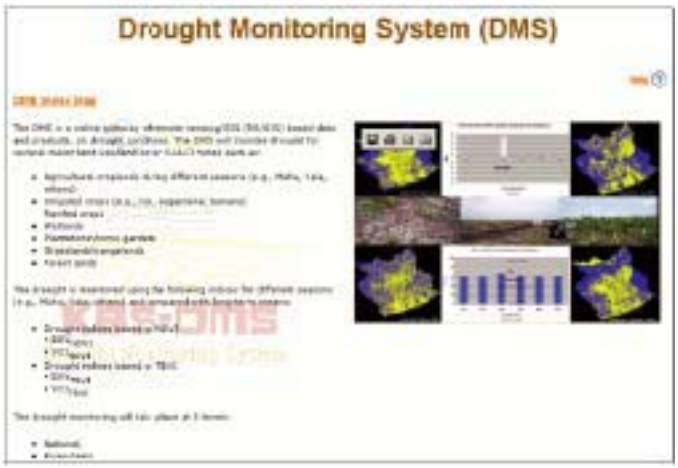
Prasad Thenkabail, Velpuri Manohar, Praveen Noojipady and Sarath Abayawardana

In the wake of natural disasters such as droughts, landslides and the tsunami, there is a pressing need in Sri Lanka for better information systems and tools for dissemination. A system of spatial data and a knowledge base would enable effective management (preparedness, assessment, mitigation, and relief) of disasters. In order to accomplish this, IWMI conceptualized and developed a comprehensive National Knowledge Base System for Sri Lanka (KBS-Lanka) that encompasses disaster preparedness and rapid response for droughts and other natural disasters, while enabling natural resource assessment and monitoring on a near-real-time basis, using remote sensing and other spatial techniques. The KBS-Lanka project has developed a near-real-time (fortnightly and/or monthly) system on the following 3 key components using satellite sensor data from advanced systems that are available free, from reliable sources:

Currently, in the first phase, KBS-Lanka is developed for IWMI's Ruhuna Benchmark Basins (comprising Walawe, Kirindi and Menik basins) as proof of concept and phase II will be extended to cover the whole island as we develop links and partnerships with the Government, particularly the newly established Disaster Management Center, the main client. Phase I will include a substantial research component in developing the methodology, while phase II will focus on building up the systems and the database.

- Baseline Information System for Sri Lanka (BIS-Lanka): Each area will be enriched with numerous baseline datasets (e.g., soil types, land use pattern, drainage, road network, hydro meteorological stations). This data will be invaluable for a rapid response and for scientific analysis of a situation or a problem. Under this system, the baseline datasets are generated from a smallest administrative unit (e.g., Grama Nilhadari) to the largest administrative unit (e.g., Country).
- Crop Monitoring for Sri Lanka (CMS-Lanka): First a baseline data set of cropped areas and crop type is mapped using high resolution satellite imagery. This will be followed by seasonal and/or annual crop assessments (e.g., percent area cultivated relative to average area cultivated over last 5-years; change in crop types, change in crop calendar).
- Drought Monitoring System for Sri Lanka (DMS-Lanka): This is based on Remotely sensed data from an advanced MODIS sensor and historical AVHRR sensor. The final product is a near-real-time online drought monitoring system that will allow drought and extreme wet conditions in different parts of the country to be detected and reported every fortnight. The methodology will be similar to the one used for DMS for South Asia (dms.iwmi.org), but most likely with an advanced on-line interface.





All research outputs and data generated will be available as 'Global Public Good' through a public domain website (http://www.iwmikbs.org). This web portal provides a remotely sensed and GIS based integrated information system and establishes a working methodology to effectively use this information and to develop an online dissemination service to reduce vulnerability issues and minimize adverse effects on the population in disaster situations. The system is built for a real time online access from anywhere in the world. The focus will be to ensure the system is being used by various line agencies of the Sri Lankan Government in its administration structure from the smallest unit (Grama Nilhadari) to the entire country. We have also focused on a wide range of natural resources secondary data fed into the system, to develop a comprehensive baseline database on natural resources. All KBS-Lanka data and products are made freely accessible as well as downloadable from any part of the world (http://www.iwmikbs.org).

This is a collaborative project carried out by the International Water Management Institute (IWMI) for enhanced disaster preparedness and rapid response for droughts and other natural disasters in Sri Lanka. The project is funded by Unilever Sri Lanka Limited as part of its commitment to sustaining water resources in Sri Lanka.

Encounters with IWMI

An Interview with the Chief Engineer of the Samanalawewa Power Station

Mr. H. S. Somathilaka is the Chief Engineer in charge of the Samanalawewa Power Station, situated within IWMI's Ruhuna Benchmark Basin. He was involved in the construction work of the Samanalawewa Hydropower Project from 1988-1993 and from 1993 onwards in the operation and maintenance work. The Samanalawewa project gave rise to some conflict scenarios between the power generator and the farmers of a downstream irrigation scheme with traditional water rights. How did this hard-core electrical engineer handle it?

It is a bit strange for an electrical power station manager to become interested in irrigation and agriculture. How did this come about?

"I suppose it is fair to call me a hard core electrical engineer; at least that is what I was. The beginning of the change was a particular day at IWMI in 1999 when I made a presentation on the economics of power generation with the conclusion that it is economically much better to stop agriculture, compensate the farmers and divert the water for power generation, which in fact I was lobbying for. The questions raised by IWMI researchers at the discussion stage made me realize that life is not quite simple as that. There are much more complex issues than can be addressed through simple economics. There are social needs, even environmental needs, and a large number of parallel issues crop up such as gender issues. I then realized that without understanding some of these needs I cannot or will not be able to work towards more optimal solutions of using water. A critical trigger that changed my perspective substantially."

In addition to your personal perspective changes, has the interaction with IWMI been helpful in other ways?

My association with IWMI has given me a good grounding in research implementation - collection of data, and making more meaningful and objective analyses to arrive at conclusions. This has enabled me to develop this culture at the power station; we now look at things in a more substantive way. We have identified a number of issues and address them through careful studies, frequently in collaboration with Institutes such as the University of Peradeniya and the University of Twente in the Netherlands. We facilitate small scale student research projects, making it a win-win situation. The organizational culture at the power station changed because of these interactions. Up to now we have completed seven small projects, not only on energy production, but even on other subjects such as soil erosion, sediment movements, and some geological aspects.

And, apart from just studies, this organizational culture change has now evolved into other areas. For example, we are more socially and environmentally responsible. We have set up a fund to provide school books to single parent children. We are working towards ISO certification. Risk analysis and management, environmentally responsible behaviour etc are part of our life at the power station. The Samanalawewa power station has become a benchmark in the CEB.

Mr. H.S. Somathilaka, Chief Engineer in charge of the Samanalawewa Power Station in the Ruhuna Basin.

Another very useful area where IWMI has been instrumental is in facilitating improved interaction and collaboration with other institutes in the basin like the Department of Wildlife, Ministry of Health, Irrigation Department, Mahaweli Authority, and the Department of Agriculture. We hardly had any meaningful relations with these organizations, until IWMI activities began in the basin. The basin network meetings and other workshops enabled us to meet each other and develop relationships, facilitating improved decision making and expediting implementation of various decisions.

Access to IWMI resources like the Library, and mechanisms for data sharing were also very helpful in my research activities.

Have you had an opportunity to work with IWMI directly on projects?

Yes, one important project was on water productivity under the Comprehensive Assessment program where irrigation water productivity in the Kaltota irrigation scheme was studied in relation to power generation options. This was in a way an extension of what I started with. An IWMI Research Report on the subject co-authored by me was published.

At my request IWMI also carried out a study on the implementation of SRI (System of Rice Intensification) in the Kaltota irrigation scheme. The results were published as a Research Report.

A paper was also written for the World Water Assessment Program, Sri Lanka Case Study on Water for Energy.

What are your views on improving water productivity in the basin?

A key drawback is the lack of coordination between various institutes dealing with water. There is also a lack of clarity and jurisdiction in managing certain issues. For example it is still not clear who is responsible for the water in the reservoir.as there are multiple users.. IWe generate power; water is used for irrigation, fishing and eco-tourism as a means of livelihoods. It is used for domestic and drinking purposes as well as for upstream mini-hydro projects. There are many issues that crop up periodically. And the procedures for resolving these issues are not clear. We have to develop them as we go along.

So I would say coordination and communication between the different agencies are key parameters. IWMI can really help in developing a better understanding of these institutional issues and by proposing remedial measures. One more thing, IWMI also needs to improve the communication of its research and outputs if its contribution is to be enhanced.

Interviewed by Sarath Abayawardana and Ranjiith Ariyaratne

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Recent Publications

Bandaragoda, D. J. 2000. A framework for institutional analysis for water resources management in a river basin context. Colombo, Sri Lanka: IWMI, 46p. (IWMI working paper 5)

Jayatilaka, C. J.; Sakthivadivel, R.; Shinogi, Y.; Makin, I. W.; Witharana, P. 2001. Predicting water availability in irrigation tank cascade systems: The cascade water balance model. Colombo, Sri Lanka: IWMI (IWMI research report 48)

Renwick, M. E. 2001. Valuing water in irrigated agriculture and reservoir fisheries: A multiple-use irrigation system in Sri Lanka. Colombo, Sri Lanka: IWMI. (IWMI research report 51)

Sakthivadivel, R.; Loeve, R.; Amarasinghe Upali; Hemakumara, M. 2001. Water scarcity and managing seasonal water crisis: Lessons from the Kirindi Oya Project in Sri Lanka. Colombo, Sri Lanka: IWMI. (IWMI research report 55)

van der Hoek, W.; Konradsen, F. 2002. Pesticide poisoning: A major health problem in Sri Lanka. In Smit, L. A. M. (Ed.), Pesticides: Health impacts and alternatives. Proceedings of a workshop held in Colombo, 24 January 2002. Colombo, Sri Lanka: IWMI.

Kikuchi, M.; Barker, R.; Weligamage, P.; Samad, M. 2002. Irrigation sector in Sri Lanka: Recent investment trends and the development path ahead. Colombo, Sri Lanka: IWMI. (IWMI research report 62)

Kikuchi, M.; Weligamage, P.; Barker, R.; Samad, M.; Kono, H.; Somaratne, H. M. 2003. Agro-well and pump diffusion in the dry zone of Sri Lanka: Past trends, present status and future prospects. Colombo, Sri Lanka: IWMI. (IWMI research report 66)

Klinkenberg, E.; van der Hoek, W.; Amerasinghe, F. P.; Jayasinghe, G.; Mutuwatte, L.; Gunawardena, D. M. 2003. Malaria and land use: A spatial and temporal risk analysis in Southern Sri Lanka. Colombo, Sri Lanka: IWMI. (IWMI research report 68)

Smakhtin, Vladimir U.; Piyankarage, Sujeewa C.; Stanzel, P.; Boelee, Eline. 2004. Simulating the hydrology of small coastal ecosystems in conditions of limited data. Colombo, Sri Lanka: IWMI, 28p. (IWMI research report 77)

Somaratne, P. G.; Jinapala, K.; Perera, L. R.; Ariyaratna, B. R.; Bandaragoda, D. J.; Makin, I. 2003. Developing effective institutions for water resources management: A case study in the Deduru Oya Basin, Sri Lanka. Colombo, Sri Lanka: IWMI. (IWMI working paper 58)

Molle, Francois; Renwick, M. 2005. Economics and politics of water resources development: Uda Walawe Irrigation Project, Sri Lanka. Colombo, Sri Lanka: IWMI, 68p. (IWMI research report 87)

Molle, François; Jayakody, Priyantha; Ariyaratne, Ranjith; Somatilake, H. S. 2004. Balancing irrigation and hydropower: Case study from Southern Sri Lanka. Colombo, Sri Lanka: IWMI, 38p. (IWMI research report 94)

Amarasinghe, Upali; Samad, Madar; Anputhas, Markandu. 2005. Locating the poor: Spatially disaggregated poverty maps for Sri Lanka. Colombo, Sri Lanka: IWMI. (IWMI research report 96)

Somaratne, Pallewatte G.; Jayakody, Priyantha; Molle Francois; Jinapala, Kiribandage. 2005. Small tank cascade systems in the Walawe River Basin. Colombo, Sri Lanka: IWMI, 43p. (IWMI working paper 92)

Smakhtin, Vladimir; Weragala, Neelanga. 2005. An assessment of hydrology and environmental flows in the Walawe River Basin, Sri Lanka. Colombo, Sri Lanka: IWMI, 13p. (IWMI working paper 103)