RUHUNA BENCHMARK BASIN PROCEEDINGS

NO: 2

Synthesis Report of the

RBMB NETWORK MEETING

Peacock Beach Hotel, Hambantota,

20th May 2004

INTERNATIONAL WATER MANAGEMENT INSTITUTE

Editors: Priyantha Jayakody Ranjith Ariyarathne Sarath Abayawardana



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Executive Summary

Ruhuna Benchmark Badin in southern Sri Lanka is one of four benchmark basins identify by IWMI for long term research and capacity building. As an institute involved in long term research in this area, IWMI held a network meeting to share the collaborators' views and opinions on issues such as optimization of water utilization and water productivity, and environment and health. The meeting will help identify these issues and related research questions as the basis for the development of the research program.

Various important research issues were raised and discussed during the meeting. These issues were incorporated in a matrix with IWMI's research work helping to identify gaps for future research. A geographical analysis of location of projects indicated that the Walawa basin has been studied well while the Kirindi and Menik basins possibly require more attention.

Importance of a Ruhuna benchmark basin committee was highlighted during the meeting and IWMI proposes that a RBMB committee should be established with the membership of middle level mangers of the stakeholder agencies. Continuing communication through the RBMB committee and support from the Consultative Committee should drive this collaboration towards establishing MOUs with relevant agencies leading to increased cooperation, data acquisition and sharing, and research activities. IWMI highlighted the need for basin monitoring indicators and the importance of such a monitoring program on a long term basis. A few basin monitoring indicators were proposed, but needs to be further developed. The meeting met its main objectives of improved awareness, strengthening partnerships and identifying research needs to a substantial degree.

Introduction

IWMI's Strategic Plan 2001-2005 proposed benchmark basins as a strategy to monitor the evolution and behavior of selected basins and to develop a long term data sets in different agro-ecological zones through partnerships with stakeholders. By committing resources to maintain research activities in these basins on a continuing basis IWMI believes that the impact of research conducted by the staff of the Institute and its partners will be greatly enhanced. The success of the benchmark concept largely depends on collaborations established between operational organizations and the research groups. Therefore, IWMI is working closely with line agencies and other organizations active in these basins in order to better understand the interactions between different water users and the impacts of different management practices. It is expected that adoption of consistent research protocols and the long-term study of water resources management would enable comparison of interactions and management strategies between the benchmark basins, both nationally and internationally.

Figure 1 Ruhuna benchmark basin



The Ruhuna Benchmark Basin (Figure 1) is one of the four IWMI bench mark basins (Olifant – South Africa, Rechna Doab – Pakistan, and Krishna – India). It includes the basins of three main rivers, Walawe Ganga, Kirindi Oya, and Menik Ganga, and the sub basins of Malala Oya, Kachchigala Ara, and Karagan Oya. The total area of Ruhuna basin is about 5,500 km². The upper part of the Ruhuna basin is mountainous with a fewer number of settlements. The lower part, in the area of southern province, consists mainly of agricultural lands under major, medium and minor irrigation systems and rainfed farming systems. Tea and rubber are grown in the upper watershed area, while rice is

the main crop in the lower part of the basin. Average annual rainfall in this part of the basin falling within the South-East dry zone is less than 1500 mm. According to the 2001 Census of Housing and Population, around 950,000 inhabit the area.

Water is the most critical factor in the Ruhuna basin. Irrigated agriculture is the main water use sector in the basin and major irrigation schemes like the Udawalwe and Lunugamwehera provide water for a large number of farmers involved in rice, banana and other field crop cultivations. While the right bank of Udawalwe is fully developed, left bank is being extended to provide irrigation to undeveloped rain-fed areas. The proposed Ruhunupura development plan (urban, port and industrial developments) will add demand for water now used for agriculture alone and make the existing situation more complex. With the increasing demand for water from other sectors under the present water short situation in the basin, greater efforts at agency and other stakeholder levels are required to make management decisions and improve water allocation. As an institute involved in long term research in this area, IWMI wishes to share the collaborators' views and opinions on issues such as optimization of water utilization and water productivity, and environment and health. The present meeting which is a follow up activity of the former was planned with the objective of identifying these issues and related research questions as the basis for the development of the research program. Since three years have already lapsed from the first meeting, the only meeting with the stake holders so far held, it was considered timely to establish further consultation through this meeting.

Purpose

- Strengthen the current relationship with agency officials,
- Disseminate the results of current IWMI research activities,
- Obtain active participation and close collaboration of local agency officials on research and data sharing,
- Obtain collaborator views and input on research planning and prioritization,
- Provide opportunity for inter-sectoral interaction to develop awareness and appreciate integrated issues in water management

Participants

Thirteen IWMI staff participated at the meeting with thirty three participants from local agencies including Mahaweli, Irrigation, Agriculture, Upper watershed, Forest, Wildlife and anti-Malaria departments/organizations, Divisional secretariats, and consultancy agencies such as Nippon Koei. Full list of participants are given in annex 1.

Meeting methodology

The agenda for the day (Annex 1) was set out with the initial session being short presentations from IWMI researchers on recent work highlighting key findings. Second session included presentations from agency officials highlighting key issues from their perspective. They were followed by small group discussions on three main topics identified (Water management and allocation, Agriculture and the environment, Basin

monitoring and data acquisition and sharing and a plenary discussions to crystallize the ideas.

Session I: Recent and Ongoing IWMI research activities

IWMI researchers presented their work in the basin highlighting key finding in order to ensure that participants are fully aware of the breadth and scope of IWMI activities. Significance of gaining an overall understanding of the changes taking place in the basin in bio-physical and socio economic environment was also highlighted, particularly since some sub basins are now nearly closed.

The research findings presented:

- Information on natural water resources
- Effect of various man made development activities based on water (irrigation, domestic, etc) and their impacts on poverty reduction, human health, and natural environment and also the impact on various livelihood activities of the communities)

The IWMI researchers also presented various new methodologies and technique available for research work:

- Application of remote sensing and geographic information systems
- Management of data/information for the use of different stakeholders for decision-making, managing water and land based development programs

The different subjects included in IWMI's presentations were:

- a. Introduction and overview of Bench Mark Basin study (Sarath Abayawardana)
- b. Integration of knowledge on water use and management in Walawe river basin (Francois Molle)
- c. Impact of irrigation on poverty (Intizar Hussain)
- d. Expansion without extinction (Biodiversity project in Left bank of Walawe irrigation scheme) (Rebeca Tharme and K. Jinapala)
- e. Human impacts on aquatic environment (S. C. Piyankarage)
- f. Simulating the hydrology of the Walawe basin (Neelanga Weragala)
- g. RS/GIS data for country level-potentials and possibilities in Sri Lanka (Chandana Gangodagamage)

Session II: The presentations of stakeholders

The stakeholder agencies presented some specific activities they are implementing on land and water development and management. These presentations included:

- Influence on Mau Ara Trans basin diversion on ground water of Malala Oya basin. Research project in collaboration with Water Resources board. (Anoja Seneviratne)
- Malaria Research and issues- The research carried out by IWMI in collaboration with Anti malaria campaign (N B Munasingha)

- Walawe Left Bank extension Program- Information about a major water development effort in the basin Mahaweli authority of Sri Lanka(N C M Navaratne)
- Kirindi Oya system performance- Problems and potential for improving irrigation management Irrigation department(M A Deheragoda)
- Power generation or irrigation or both- experience and problems in multiple water use Ceylon electricity board (H S Somathilaka)
- Upper water shed issues and directions- Experience of water shed management project-Upper watershed management project (Ajith Silva)
- Over view of domestic water supply issues in Monaragala district- problems of water quality- National water supply and drainage board (Abu Ubaibbha)

Some of the presentations highlighted research issues, while some were descriptions of a particular project or a specific issue. Issues arising from these presentations were incorporated to the final matrix (see synthesis).

Session III: Group discussion

Three topics were identified for group discussions.

- Water management and allocation
- Agriculture & Environment
- Monitoring catchment changes, data acquisition, sharing and management

Each group was facilitated by two IWMI scientists. The key issues emerged at the group discussions were further discussed at the final panel discussion Representatives of groups presented their issues to the audience. Following is a summary of the main points.

Topic: 1 Water management and allocation

1. Sharing of water resources among users and institutions.

Lack of coordination among different agencies and users is a main problem for managing the water resources effectively. The following points were identified for future improvements.

- A coordinating body for water management
- A water allocation plan, based on real time seasonal crop water requirement
- A monitoring plan for better implementation
- Implementation of plans properly to reduce farmer uncertainty and encourage them to use water more productively

2. Increase water productivity.

There is a scope to reduce wastage and improve the efficiency of water distribution in irrigation schemes. The following key point need to be considered.

- Awareness programs for farmers
- A meaningful incentive schemes for farmers
- Water allocation methodologies to avoid imbalances in the whole system, when a new extension area is commissioned

3. Water use efficiency in water short situations

Certain measures can be adopted to improve water use efficiency under limited water supply conditions.

- Reduce the cultivation area when the supply is limited to ensure good crop productivity
- Select the crop which has shorter growing season and require less water
- Select the crops according to the soil conditions
- The methods such as Alternative Wet and Dry Irrigation (AWDI), drip irrigation, and System of Rice Intensification (SRI) are some of the techniques being tested

Participants in the group discussion:

Dr. Francois Molle	IWMI
Mr.H.S.Somathilaka	Ceylon Electricity Board
Mr.Abu Ubaibbha	National Water Board
Ms Indika Wickramasinghe	ID
Mr M. A. Deheragode	ID
Mr W A K Karunathilke	Department of Agriculture
Mr Chandana Gangodagamage	IWMI

Topic: 2 Agriculture and environment

1. Upper catchment degradation

Rapid expansion of poorly managed agricultural activities, especially tea and vegetables (tomato, beans etc.), chena cultivation and forest fires in the upper catchment are the main reasons for environmental and land degradation. Following key areas were identified as future concerns.

- Mitigation measures for soil erosion
- Water resources quality and quantity deterioration due to expansion
- Lack of data on land use changes and their impact on environment
- Importance of an institution to take over the management responsibilities to implement suitable policies.
- Correlation between chena and malaria
- Correlation between forest fire and soil erosion , water resources and biodiversity
- 2. Impacts of diffuse agricultural and industrial pollution on environment specially in national parks and wetlands:

It is important to consider environmental consequences and the ongoing agricultural development activities. The following issues were raised during the discussion.

- Magnitude and the extent of damages due to diffuse pollution to flora and fauna and water quality
- Monitoring of water quality changes in open water bodies and ground water

- Livestock grazing inside the national park and its impacts
- The Integrated Pest and Vector Management (IPVM) practices as a alternative for the use of pesticides
- The impact on the environment due to the "Ruhunupura" mega city
- Agricultural drainage and the Bundala National park wetland system
- Importance of translation and dissemination of research findings for implementation
- 3. The impacts of river diversions/damming on the environment:

The diversion and damming of rivers have severe impacts on the flora and fauna of the downstream areas. The following two topics were discussed as issues in the Ruhuna basin

- Menik ganga diversion and environment
- Minimum environmental flow requirements to conserve bio diversity
- 4. The impacts of illegal mining activities on the environment:

It was pointed out that sand mining; gem mining and shell mining carried out in the area illegally have negative impact on the environment and need to be controlled through proper monitoring and investigation.

- Sand mining and their impacts
- The gem mines left unclosed become good breeding sites for mosquitoes.
- Illegal shell mining in the Bundala National Park
- Better management plans based on proper investigations are essential, in addition to the existing rules and regulations to control these illegal activities.

the group discussion.	
Ms Rebeca Tharme	IWMI
Mr S.C Piyankarage	IWMI
Mr N.B. Munasinghe	AMC
Mr J.L.P Nimal	DOA
Mr Priyantha Weerasinghe	DOA
Mr Gunadasa Edirinsinghe	DOA
Mr S.M.A Nelugolla	ID
Mr B.A Muthubanda	DWC
Mr W.N. De Silva	DWC
Mr R.M.P Chandana	DWC
Mr Y.G.P.Karunarathne	DWC
Mr Bhatiya Kakulandala	IUCN
Mr Ajith Silva	UWMP
Mr.Mahinda Senevirathne	DOFC
Mr A.P.N Edirisinghe	DOFC

Participant in the group discussion:

Topic: 3 Monitoring Basin changes, Data acquisition, management and sharing

The two discussion groups on Monitoring catchment changes and Data Sharing were merged to a single group. The group discussed about hydrological, environmental, and socio-economical changes occurring in the Ruhuna Benchmark Basins and the efforts on monitoring these changes by various agencies. All participants agreed on the importance of IWMI's role in this context. Initially the reasons for monitoring were discussed.

- 1. Why Monitoring Changes & Data Sharing is required?
 - Requirement of a common knowledge base.
 - For assessing the impacts of interventions.
 - Corrective measures/interventions.
 - Better understanding of the evolution of the basin.
- 2. What to monitor?

It was also agreed that the collection and sharing of data is not properly organized currently. Data are collected by different agencies for various purposes, mainly for the use within the agency. Agencies use diverse methods in collecting, compiling and processing data leading to problems of compatibility, quality, accountability and reliability if data are to be used by others. Participants highlighted the problems arising in acquiring data from various government agencies. IWMI is working on a central database which can be accessed by other agencies. Such a facility will be maintained as a global public good. Institutional arrangement among agencies made through a formal MOU is important for sharing such data and information. Organizations may work cordially at the regional level but it is important that the higher levels of the organizations management are informed about the linkages and the purposes of such linkages at regional level. It is important to identify and delegate activities to a suitable officer so that any person can contact him over sharing of information and ideas. Five main areas for monitoring changes taking place were identified.

- Changes in Hydrology.
- Changes in Land use, Agriculture (Biodiversity).
- Socio-economic changes /Poverty.
- Demographic changes population.
- Institutional changes.

3. How to monitor changes /share data?

It was agreed the better management of data is required. A sequence of "steps to follow" were agreed to achieve this.

- Develop data/information base.
- Compile existing data/information / Identify data gaps.
- MOU with partners/Stake holders on data sharing.
- Establish RBMB Committee for the following purposes:
 - Facilitation of RBMB activities (Monitoring & Data sharing).
 - Contribute to data base development.

- Information sharing/dissemination/feedback.

The participants appreciated the role IWMI has played so far in this context and requested IWMI to take initiative in establishing the RBMB coordination committee.

4. Develop key indicators

It was agreed to develop key indicators through further internal brainstorming to monitor the changes in the basin and to some degree to evaluate impacts of interventions.

Mr M D Piyathilaka	Nippon Koei Co.
Mr Sepala Karunasena	CEB
Ms A. A. A K. K. Senawirathne	WRB
Mr S Niyangoda	Lanka Jalani
Dr Intizar Hussain	IWMI
Dr Sarath Abeywardana	IWMI
Dr Mardar Samad	IWMI
Mr K Jinapala	IWMI
Mr Neelanga Weragala	IWMI
Mr Priyantha Jayakody	IWMI
Mr Ranjith Ariyaratne	IWMI
Mr Parakrama Weligamage	IWMI

Participants in the group discussion:

Synthesis

A number of research and implementation issues were raised during the network meeting. These issues were classified in to broad research categories, highlighted and discussed at the meeting. Some of these are already addressed by IWMI research while some are not adequately addressed. The matrix, (Figure 2) map IWMI's recent and current work against the key research categories. Apart from the early projects, fifteen research projects have been started in the recent past in the basin. Some of these studies are already completed. The Matrix was prepared by giving weightage to the degree of significance of individual studies for each research category taking in to account, the focus level and coverage aspect. The geographical spread of the projects is shown in Figure 3. In addition to the projects presented in the matrix, several simpler studies also have been conducted in the basin by graduate students as interns.

Two significant technical assistance studies undertaken and completed before the concept of the Benchmark Basin, was in the Kirindi and Walawa basins- Irrigation management and crop diversification related research in Kirindi Oya basin and rehabilitation and irrigation management studies in the Walawa basin. These two studies provided information and recommendations to the local partners and the government agencies, with clear on-the-ground results.

Figure 2 Research Matrix

IWMI Themes			I		Γ	11		111	I		V			,	/		
Study Topics	Status (a)	Water Resource Potential	Water Management	Modeling, RS/GIS	Chena & Rainfed agriculture	Soil & Land degradation	Inland Fisheries	Ground Water	Poverty Assessment	Institutions	Socio Economic	Demographic Changers	Bio diversity	Water Quality	Wildlife	Health	Geographical Focus
Studies conducted before BMB	С	3	2				1			2	1						Α
Comprehensive Assessment																	
Anicut systems study	С	2										1					W
Small Tanks	С	1										1					W
Water Management at D canals	С		1														W
Water Balance	0	1		1													W
Prospects for adopting system of Rice Intensification in Sri Lanka	С										1						w
Themes				•						•	•			•			
Malala Oya Ground Water Assessment study	0	1						1						1			L
Expansion without extinction	0												2		1		W
Impact Assessment of Irrigation Infrastructure	C																
Development on Poverty Alleviation	U								2	1	2						W
Study on Multiple use of Irrigation	С	1															W
Malaria risk mapping- Udawalawe	С															2	K/M
Malaria risk mapping- Sri Lanka	0																Α
"Ruhuna" Basin poverty mapping study	0								3			1					A
Walawa SAPI study	С	1	1	1													W
Agro-chemicals: Health Impacts and Alternatives	0															1	K/M
Impacts of Irrigation Development on Fisheries	С						1										K/W
Interns																	
Assessment of downstream impacts of an irrigation extension project in Uda Walawa	С			1										1			w
The hydrochemistry of the Uda Walawa Basin and the factors that influence ground water quality	С							1						2			w
Estimating irrigation induced changers of water and																	
salinity in Karagan lagoon	С													1			G
Water efficiency and equity in an irrigation system: The																	
case of Walawe River Basin	C		1														w
Assessing irrigation water use with remote sensing			2	1													w
Uda Walawe Right Bank water balance	С		1														W
Ground water Research in Malala Ara Basin using Dug well Data	С							1						1			L

(a) Status: C- Completed; O- Ongoing

(b) IWMI Research Themes : I-Integrated Water Management for Agriculture; II- Small Holder Water Management Systems; III- Sustainable Ground Water Management; IV- Water Institution and Policies; V- Health and Environment

(c) Significance level 1 = Minor, 2 = Moderate, 3= Major
(d)Geographical Focus (River Basins): G-Karagan Oya; K-Kirindi Oya; L-Malala Oya; M-Menik Ganga; W-Walawa Ganga

According to the matrix, majority of IWMI projects are focusing on the main research categories related to IWMI themes such as water resource management, sociology and Modeling. Environment related categories have received less focus compared to the other categories.

As seen in figure 3 below, most of the current IWMI research focuses on the Walawe basin. Anicut study focuses on upper reaches of the Walawe and small tank study focuses on the lower part of the Walawe basin. Expansion without extinction and the JBIC study mainly focus on Walawe left bank area and Malala Oya ground water study is confined to the Malala Oya sub basin. Base line data, water balance and multiple use of irrigation study covers the whole Walawe basin and malaria studies cover mostly the Kirindi Oya and Menikganaga basins. Poverty mapping study is one study which covers the whole Ruhuna basin.

Figure 3 Geographical coverage of the projects



Recommendations

Strengthening the relationship

Improved communication and resource sharing will strengthen collaboration among stakeholders. Mechanism for improved communication should be developed. Local agencies and stakeholders should review applicability of the knowledge generated by research organizations and incorporate this knowledge in basin management plans. At present there are no such institutional arrangements for integration of research into implementation. An example of this is the opportunity to incorporate findings from previous malaria studies in Walawa Left Bank extension work. As proposed in the network meeting a RBMB committee should be established with the memberships of middle level mangers of the stakeholder agencies. The committee can support in the following aspects.

- Facilitation of data sharing and information gathering
- Dissemination of research findings
- Capacity building through research and dissemination
- Identification and communication of the emerging issues
- Keeping the top management of respective agencies informed of research activities and issues in the basin.

For the success of the committee IWMI benchmark basin coordinator should work closely with the committee members and facilitate regular meetings. Issues discussed in the meetings should be documented and fed back to relevant agencies and IWMI.

Research Issues

Timely updates on researchable issues in the basins will help government agencies and research institutions including IWMI to take necessary actions immediately. Many of the issues in Walawa basin have been captured by IWMI research, but more management issues may emerge after commissioning water to the left bank extension. Other basins, with relatively less attention in recent times also have issues to be addressed. Some of the research issues identified during the meeting are highlighted below. An attempt is made here to rank these in relative importance based on identified gaps in the matrix shows in Figure 2.

- Water productivity
- Inter-sector water allocation
- Water management and allocation within Uda Walawe scheme
- Incentives for the reduction of water diverted to Kaltota scheme
- Rain water harvesting
- Chena and land degradation
- Rain fed agriculture
- Forest fires as a source of land degradation
- Natural resource mining and sustainability
- Effect of land use patterns in catchment degradation

• Effect of Stream diversions on natural environment

Theses issues could be further discussed internally and at the forthcoming Consultative Committee meeting, and in the RBMB committee prior to identification as special projects and development proposals.

In future the RBMB committee could be used to identify significant issues in the basin for further action. Committee will enable building pathways and pave the way for proposal development and acquisition of funds.

Monitoring program

The data gathered through different projects can be used to evaluate the overall changes in the basin over time. A broad list of indicators identified at the meeting is given below, but needs to be developed and refined after further internal discussion.

Indicator	Data /Information	Source
Cropping intensity	Major system	Annual reports and projects
	Small tanks	
	anicuts	
Irrigated area	Major system	GIS
	Small tanks	
	anicuts	
Population Density	Demographic data	Surveys and Resource profile of the DS
Total forest cover	Land use map	GIS
Total chena area	Land use maps	GIS
Production	Crop yields	
Water resource potential	Surface	Measurements and estimation
_	Ground water	
Farmer income/poverty	Poverty	Census, Statistics, project information
Governance	Active WUAs	

Table 1 Proposed Basin monitoring indicators (For discussion)

Annex 1 – Participants list and the agenda

Agenda

Time	Activity
09:00 – 09:30 am	Tea and Registration
09:30 – 09:50 am	Welcome and Introduction by Dr Sarath Abayawardana, Director - Global Research Division, IWMI
09:50 – 10:10 am	Integration of knowledge on water use and management in Walawe basin by Dr Francois Molle, Principal Researcher, IWMI
10:10 – 10:25 am	Impact of irrigation on poverty by Dr Intizar Hussain, Senior Researcher, IWMI
10:25 – 10:40 am	Expansion without Extinction by Dr Rebecca Tharme and K Jinapala, Researchers, IWMI
10:40 – 10:55 am	Human Impacts on the aquatic environment by Sujeewa Piyankarage, Researcher, IWMI
10:55 – 11:15 am	Tea
11:15 – 11:30 am	Influence of Mau Ara trans-basin diversion on groundwater of Malala Oya basin by Anoja Seneviratne, Geologist, Water Resources Board
11:30 – 11:45 am	Malaria research and issues by Mr N B Munasingha, Regional Officer, AMC
11:45 – 12:00	Simulating the hydrology of the Walawe river basin by Mr Neelanga Weragala, Research Officer, IWMI
12:00 – 12:15 pm	RS/GIS data for country level – Potentials and Possibilities for Sri Lanka by Chandana Gangodagamage, Research Officer, IWMI
12:15 – 12:30 pm	Walawe Left Bank Extension Program by Mr N C M Navaratne, Project Director, MASL

Time	Activity
12:30 – 12:45 pm	Kirindi Oya system performance by Mr M A Deheragoda, Chief Irrigation Engineer, Irrigation Department
12:45 – 01:00 pm	Power generation or irrigation or both by Mr H S Somathilaka, Chief Engineer, CEB
01:00 – 02:00 pm	Lunch
02:00 – 02:15 pm	Upper watershed issues and directions by Mr Ajith Silva, Deputy Director, Upper Watershed Management Project
02:15 – 02:30 pm	Overview of domestic water supply issues in Monaragala District by Mr Abu Ubaibbha, NWDB
02:30 – 02:45 pm	Agricultural impact on wild life by Mr Y K G Karunaratne, Park Warden, Department of Wildlife Conservation
02:45 – 03:30 pm	Group Discussion (Tea will be served at the discussion)
03:30 – 04:10 pm	Group presentations (10 minutes/group)
04:10 – 04:50 pm	Panel Discussion and Conclusion
04:50 – 05:00 pm	Vote of Thanks
05:00 – 06:30 pm	Reception

List of Participants

Institution/Agency	
Name	Designation
<u>Anti Malaria Campaign</u>	
Mr. A.M. Munasinghe	Regional Malaria Officer/Embilipitiya
Ceylon Electricity Board	
Eng. H. S. Somatilaka Eng. Sepala Karunasena	Chief Engineer/Samanalawewa Power Station Maintenance Engineer/Samanalawewa Power Station
Department of Agrarian Develop	oment
Mr. W. A. S. Senarath	Divisional Agrarian Development Officer/Monaragala
Mr. Mahinda Weerasinghe	Asst. Commissioner/Ratnapura
Department of Agriculture	
Mr. Gunadasa Edirisingha Mr. W. A.K. Karunathilake Mr. J. L. P. Nimal Mr. Priyantha Weerasingha	Provincial Director of Agriculture/Ratnapura Research Officer/RARC-Angunukolapelessa Assistant Director of Agriculture /Hambantota Research Officer/RARC-Angunukolapelessa
Department of Fisheries	
Mr. Indunil Pathirana	Regional Aquaculture Extension Officer/Udawalawe
Department of Forest Conservati	<u>on</u>
Mr. W. P. Abeyratne Mr. A.P.N. Edirisinghe Mr. Mahinda Senavirathne	Forester/Monaragala Division Divisional Forest Officer/Hambantota Deputy Conservator of Forest/Ratnapura Region

Department of Irrigation

Eng. D. Abeysiriwardena	Resident Engineer/ HIRP
Eng. Ms. B. A. K Chandralatha	Resident Engineer/Ambalantota
Eng. M. A. Deheragoda	Chief Irrigation Engineer/Debarawewa
Eng. S. M. A. Nelugolla	Resident Engineer /Weli Oya Project
Eng. Ms. I. Wickramasingha	Irrigation Engineer/Debarawewa

Department of Wildlife Consertaion

Mr. R. N. P. Chandana	Ranger/Yala National Park
Mr. Y. G. P. Karunaratne	Park Warden/Bundala National Park
Mr. B. A. Muthubanda	Assistant Director/Southern Region
Mr W N de Silva	Park Warden/Lunugamwehera National Park
Mr. J. A. Weerasingha	Park Warden /Uda Walawe National Park

IUCN-Sri Lanka

Mr. Bhathiya Kakulandala	Programme Officer
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Mahaweli Authority of Sri Lanka

Eng. N. C. M. Nawaratne	Project Director/Walawe Left Bank Expansion
Mr. Ranjith Perera	Resident Project Manager/Uda Walawe

Ministry of Forestry and Environment

Mr. Ajith Silva	Deputy Director/Upper Watershed Management
	Project

Ministry of Public Administration

Mr. W. A. Dharmasiri	Asst. District Secretary/Hambantota
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Nipon Koei

Mr Y. Sano	Program Leader/ Sri Lanka
Mr. H. A. B. Karunaratne	Team Leader/Walawe Left Bank Project
Mr. M. D. Piyathilaka	Agricultural Advisor

Water Resources Board

Miss Anoja Seneviratne Geologist

Water Supply and Drainage Board

Mr. S Abu Ubaiddha Senior Engineer

IWMI Participants

Dr. Sarath Abayawardana	Director/Global Research Division
Mr. Ranjith Ariyaratne	Benchmark Basin Coordinator
Mr. Chandna Gangodagamage	Remote Sensing Specialist
Dr. Intizar Hussain	Senior Economist
Mr. Priyantha Jayakody	Agricultural Engineer
Mr. K. Jinapala	Institutional Specialist
Dr. F. Molle	Water Management Specialist
Mr. Samarathilake Niyangoda	Chairman/Sri Lanka National Water Partnership
Mr. Sujeewa Piyankarage	Chemist
Dr. Madar Samad	Theme Leader/WRIP
Ms. Rebecca Tharme	Freshwater Ecologist
Mr. Nilanga Weragala	Civil Engineer
Mr. Parakrama Weligamage	Agricultural Economist