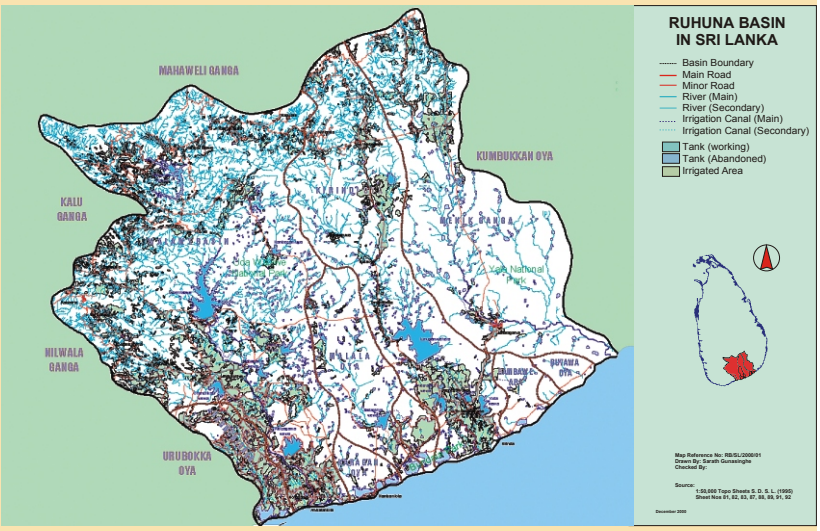
WORKING PAPER 27

Ruhuna Benchmark Basin Activities

Proceedings of the Inaugural Meeting held at Peacock Beach Hotel, Hambantota, Sri Lanka 15 June 2001



Editors: Manju Hemakumara, Randolph Barker and Peter Droogers

International Water Management Institute

FUTURE HARVEST
IWMI is a Future Harvest Center supported by the CGIAR

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/ water resource management / river basins / case studies / productivity / planning / mapping / remote sensing / databases / wetlands / Sri Lanka /

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Please direct inquiries and comments to: *iwmi-research-news@cgiar.org*

Contents

Abbreviations

AWDI	=	Alternative Wet and Dry Irrigation
BAU	=	Business As Usual
CEB	=	Ceylon Electricity Board
DSE	=	Deutsche Stiftung für Internationale Entwicklung
GDP	=	Gross Domestic Product
GWP	=	Global Water Partnership
HELP	=	UNESCO's Hydrology for Environment, Life and Policy
ICID	=	International Cooperation on Irrigation Drainage
ICSU	=	International Council of Scientific Union
ID	=	Irrigation Department
IDRC	=	International Development Research Center
IGBP	=	International Global Biosphere Program
IHP	=	UNESCO's International Hydrology Program
IMD	=	Irrigation Management Division
IMT	=	Irrigation Management Transfer
INMAS	=	Integrated Management of Irrigated Agricultural Settlements
IPCC	=	Intergovernmental Panel on Climate Change
IPTRID	=	International Program for Technology and Research in Irrigation and Drainage
IUCN	=	World Conservation Union
IWMA	=	Integrated Water Resource Management for Agriculture
IWMI	=	International Water Management Institute
IWRM	=	Integrated Water Resources Management
I & WRM	=	Irrigation and Water Resources Management
JBIC	=	Japanese Bank for International Cooperation
JICA	=	Japan International Cooperation Agency
LB	=	Left Bank
MASL	=	Mahaweli Authority of Sri Lanka
MOU	=	Memorandum of Understanding
NGO	=	Non-Governmental Organization
NWSDB	=	National Water Supply and Drainage Board
OFC	=	Other Field Crops
RBBP	=	Ruhuna Benchmark Basin Program
RS	=	Remote Sensing
SAC	=	Study Advisory Committee
SDA	=	Southern Development Authority
SL	=	Sri Lanka
SLNWP	=	Sri Lanka National Water Partnership
TEC	=	Technology, Economics and Private Sector
UNESCO	=	United Nations for Educational, Scientific and Cultural Organization
UN	=	United Nations
VAL	=	Values and Lifestyles
WB	=	World Bank

WCRP	=	World Climate Research Program
WHE	=	Water, Health and Environment
WHO	=	World Health Organization
WMO	=	World Meteorological Organization
WRB	=	Water Resources Board
WRIP	=	Water Resources Institutions and Policies
WRIS	=	Water Resources Information System
WRS	=	Water Resources Secretariat
WSI	=	Water Saving Irrigation
WWAP	=	World Water Assessment Program (of the United Nations)
WWDR	=	World Water Development Report (of the United Nations)

INTRODUCTION

The inaugural meeting of the Ruhuna Benchmark Basin Activities was held on Friday, June 15 at the Peacock Beach Hotel, Hambantota. Fifty-nine participants representing various government agencies, NGOs, the International Water Management Institute, and the media met to develop a plan for collaboration among partners and stakeholders on research and development activities.

Ian Makin, Regional Director (Asia) welcomed the participants, gave a brief overview of IWMI's research agenda. IWMI's research activities in the Ruhuna Basin are described on page 6. The objectives of the workshop are as follows:

- To discuss the concept of the benchmark basin and define the Ruhuna Basin.
- To discuss water management and related activities being carried out by major stakeholders in the Ruhuna Basin.
- To identify the benefits to be derived from the *benchmark basin program*, the contributions of the various partners, and the priority activities.
- To agree on the next steps to operationalize activities.

In the morning session 15 presentations from various agencies were given and summaries of these presentations are included in this report. The afternoon was used for smaller working group discussions focussing on the following four questions:

- What kinds of benefits would you hope to get?
- How can you contribute?
- What are the priority areas?
- How to proceed?

A summary of these group discussions is attached in the last chapter.

Finally, three appendices are attached explaining briefly various international initiatives in setting up a close collaboration with the Ruhuna Benchmark Basin Program:

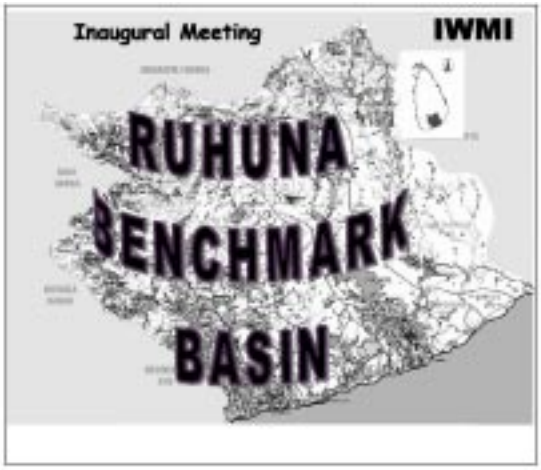
- World Water Assessment Program, WWAP, Appendix C
- Hydrology for Environment, Life and Policy, HELP, Appendix D
- Dialogue on Climate Variability, Climate Change, and Water Resources Management, Appendix E

At the end of the day, Ian Makin closed the workshop and thanked the participants for their presentations and their active role in the discussions.

WORKSHOP PROGRAM

Time	Topic	Speaker
10:00 to 10:15 hrs	Welcome address, brief overview of IWMI's research agenda and workshop objective	Mr. Ian Makin, IWMI
10:15 to 10:30 hrs	Concept note – Benchmarking river basins	Mr. Manju Hemakumara, IWMI
10:30 to 10:50 hrs	World Water Assessment Program	Mr. Ranjith Ratnayake, Ministry of Irrigation and Water Resources Management
10:50 to 11:00 hrs	Discussion	All participants
11:00 to 11:10 hrs	Ruhuna Benchmark Basins – Irrigation Department's Interest and Involvement	Mr. H.M. Jayatilake, Deputy Director (Irrigation Management and Operations), Department of Irrigation
11:10 to 11:20 hrs	Banana Kingdom of Sri Lanka	Mr. M.D. Piyathilake, Deputy Resident Manager (Agriculture), Embilipitiya, MASL
11:20 to 11:30 hrs	Department of Wildlife Conservation	Mr. H.D. Ratnayake, Deputy Director, Department of Wildlife Conservation
11:30 to 11:40 hrs	Water Supply in Hambantota District	Mr. Nalin Wickrematunge, Asst. General Manager (S), NWSDB
11:40 to 11:50 hrs	TEA	
11:50 to 12:00 hrs	Vision and The Mission	Mr. Prabath Witharana, Engineer, Agrarian Services Department
12:00 to 12:10 hrs	Data Base	Mr. H.D. Sumanaratne, Department of Agriculture
12:10 to 12:20 hrs	Southern Development Authority	Mr. G.W. Sampson, Southern Development Authority
12:20 to 12:30 hrs	Water and Health	Dr. Felix Amerasinghe, IWMI
12:30 to 13:30 hrs	LUNCH	
13:30 to 13:40 hrs	INMAS Program	Mr. S.A.P. Samarasinghe, Director, IMD Division
13:40 to 13:50 hrs	Energy Saving by cross comparing the worth of Samanala Wewa waters to Power Generation and Agriculture	Mr. Lakshitha Weerasinghe, Electrical Engineer CEB
13:50 to 14:00 hrs	Sri Lanka National Water Partnership	Mr. Nanda Abeywickrema, IWMI
14:00 to 14:10 hrs	National Aquaculture Development Authority	Mr. A.M. Jayasekera, Director General, NAQDA
14:30 to 16:00 hrs	Working Group Sessions	All participants
16:00 to 16:45 hrs	Summary and Concluding remarks	Dr. Felix Amerasinghe, IWMI
16:45 to 17:00 hrs	Vote of thanks	Mr. Ian Makin, IWMI

OVERVIEW OF IWMI



IWMI

Thematic Research

Improving water and land resources management for food, livelihoods and nature

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IWMI Research Themes

- Integrated Water Management for Agriculture (IWMA)
- Sustainable Smallholder Water & Land Management Systems (SSWLMS)
- Sustainable Groundwater Management (SGM)
- Water Resource Institutions & Policies (WRIP)
- Water, Health & Environment (WHE)

Benchmark Basin Workshop - 15/06/2001

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Integrated Water Management for Agriculture (IWMA)

- Mahaweli System C – Analysis of Benchmark survey and advice to JBIC
- Benchmarking Irrigation System Performance
- Impact of Water Saving Irrigation Techniques in Rice in Uda Walawe
- Sri Lanka/Eco – Water Savings
- Water Accounting and Identifying Flow Paths to Wetlands and Sinks in Walawe Basin

Benchmark Basin Workshop - 15/06/2001

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Smallholder Water & Land Management Systems (SWLMS)

- New Theme - projects to be developed
  - Benchmark Basins will include activity in this theme
  - IMD have requested IWMI input for Watershed Management in INMAS Projects

Benchmark Basin Workshop - 15/06/2001

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Sustainable Groundwater Management (SGM)

- New theme - project activities, including:
  - Effectiveness of river basin institutions project, special study on groundwater use
  - Impact of lining in Walawe Basin
- New Projects to be developed

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Water Resource Institutions & Policies (WRIP)

- Effectiveness of Water Resources Management Institutions
- Ridi Bendi Ela Farmer Company
- Evaluation of INMAS Program
- Impact Assessment of Infrastructure Development on Poverty Alleviation: Case Studies on Irrigation Project

Benchmark Basin Workshop - 15/06/2001

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Water, Health & Environment (WHE)

- Water Management for Malaria Control in Tank Cascade Systems
- Malaria Risk Mapping
- Agro-ecosystem Approach to Human Health
- Pre-development Biodiversity Assessment of the Uda Walawe Irrigation Project Extension Area

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Strengthening Research Partnerships

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Objectives

- Increase national relevance of IWMI research
- Expand partnerships with line agencies, national research organizations, and development agencies
- promote strategic planning of research and collaborative development of research proposals

Benchmark Basin Workshop - 15/06/2001

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Benchmark Basins

- Why benchmark basins
- What differences will benchmark basins imply
- What is the Ruhana Basin & why is it been proposed as a Benchmark Basin

Benchmark Basin Workshop - 15/06/2001

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BENCHMARK BASINS

➢ **Proposed in IWMI's Strategic Plan 2001 - 2005 as a means to give greater focus to IWMI research**

Main Objectives are to:

★ Understand and beneficially influence water resource development

★ Enhance partnerships with national partners

★ Capitalize on long-term research in different agro-ecological zones

★ Utilize IWMI resources to conduct research on priority issues

Benchmark Basin Workshop - 15/06/2001

IWMI

BENCHMARKING RIVER BASINS

Benefits of benchmarking

- Strategic research planning
- Development of standardized and robust methodologies
- Development of long-term partnership with researchers and practitioners
- Enable cross comparison to derive generic results
- Identification of options and development alternatives

Benchmark Basin Workshop - 15/06/2001

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Workshop Objectives

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Objectives

- Introduce Concept of Benchmark basins
- Review agency activities and functions
- Discuss priority issues in the basin
- Determine how to implement Benchmark Basin Concept in Sri Lanka

Benchmark Basin Workshop - 15/06/2001

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And now to Business!

THE BENCHMARK BASIN CONCEPT

Over the past few years there has been a growing interest in the water or river basin from the perspective of both management and research. The basin provides a natural hydrological focal point for examining, analyzing, and managing multiple and often competing uses for water. Identifying the potential for water savings, increasing the productivity of water, and meeting the various social and environmental water needs is best viewed in the context of basin water resources.

Taking this into account, we at IWMI, in developing our strategic plan over the past several months have begun to ask how we might work together with our partners and stakeholders to begin to understand and solve problems from a basin perspective. The Benchmark Basin initiative was proposed in IWMI's Strategic Plan 2001-2005 as an approach to understand and beneficially influence water resources development in selected basins in a variety of agro-ecological zones. By committing resources to develop and maintain long-term research activities and data sets in these basins, IWMI believes that the impact of research conducted by the staff of the Institute and its partners will be greatly enhanced. Following discussions with key stakeholders, basins in Sri Lanka, Pakistan, and South Africa have been identified.

In making a long-term commitment to benchmark basins, IWMI plans to conduct a significant amount of its own research in these basins. This research will focus on questions such as:

- how to manage basin water resources to increase water productivity;
- how to incorporate human and environmental impacts in the evaluation of water productivity;
- how to manage surface water and groundwater for conjunctive use;
- how to design databases and information systems to permit timely planning and management of basin water resources.

These are questions of generic and long-term interest to those concerned with improving basin and system level planning and management. However, there are a number of related activities which will be of more immediate interest to participating agencies such as: (i) training in water accounting as a tool in water management, (ii) mapping irrigated areas using remote sensing, (iii) conduct of workshops involving different agencies to address problems such as protection of wetlands.

The initial task represented by this workshop is to conduct a dialogue among partners and stakeholders in the Ruhuna Basin. A major objective is to identify these issues and research and also development activities considered to be of highest priority to partners and stakeholders.

PRESENTATIONS

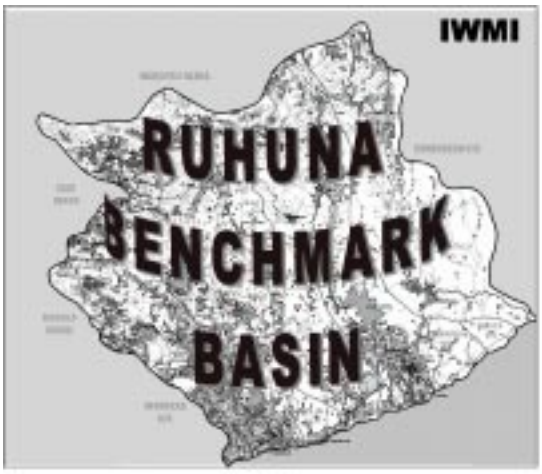
Defining the Ruhuna Basin

Manju Hemakumara, IWMI

Benchmarking river basin is a systematic learning and improvement process to understand basin performance and water resources management. IWMI's Strategic Plan 2001-2005 proposed benchmark basins as a methodology to develop long-term data sets on selected basins in a variety of agro-ecological zones. By committing resources to maintain research activities in these basins IWMI believes that the impact of research conducted by the staff of the Institute and its partners will be greatly enhanced. Following discussions with key stakeholders, five contiguous river basins in the south-east, including Walawe, Kirindi Oya and Menik Ganga, covering approximately 5500 sq. km have been selected as the Ruhuna benchmark basin. IWMI Sri Lanka consultative committee meeting held on 27 April 2001, formally endorsed the benchmark basin activities in Sri Lanka.

The present water related complexities and growing competition for water in southern Sri Lanka have created an excellent 'living laboratory' for various studies whilst validating and testing research concepts and tools.

The success of the benchmark concept depends on collaborations between operational organizations and the research groups. Therefore, IWMI hopes to work 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 alternate 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.



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BENCHMARK BASIN ACTIVITIES

- **Proposed by IWMI's Strategic Plan 2001 - 2005**
- **Endorsed by IWMI Sri Lanka Consultative Committee**

Main Objectives are:

- Enhancing partnerships with national partners
- Long-term research in different agro-ecological zones
- Understand and beneficially influence water resource development
- Commit IWMI resources to long-term research activities to address priority issues

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WHY AT THE RIVER BASIN SCALE?

- Growing interest from the perspective of management and research
- Provides natural hydrological focal point for examining, analyzing and managing multiple and often competing uses for water
- Potential for water savings, increase the productivity of water and meeting the various social and environmental water needs is best viewed

IWMI

BENCHMARKING RIVER BASINS

Benchmarking river basins is proposed as a systematic learning and improvement process to understand basin performance and water resources management.

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BENCHMARKING RIVER BASINS

Benefits of benchmarking

- Strategic research
- Development of standardized and robust methodologies
- Development of long-term partnership with researchers and practitioners
- Enables cross comparison to derive generic results
- Identifies options for development alternatives

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Expected outputs are:

- Enhanced impact of research conducted by IWMI and its partners
- Availability of comprehensive database
- Professional development
- Identification of development options and impacts
- Research on national water resource priorities and issues

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BENCHMARK BASIN ACTIVITIES

Research Activities:

Research will focus on generic questions whilst addressing local issues relevant to improving basin and system level planning and management

- ★ How to manage basin water resources to increase water productivity
- ★ How to incorporate human and environmental impacts in the evolution of water productivity
- ★ How to manage surface water and groundwater for conjunctive use
- ★ How to design databases and information systems to permit timely planning and management of basin water resources
- ★ Research on other priority issues

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PROPOSED "RUHUNA" BENCHMARK BASIN AREA

Covers Three Main River Basins (Walawe, Kirindi Oya and Menik Ganga)

Includes other smaller basins like Malala Oya, Kachchigala Ara, Karagan Oya, Weligatta Ara etc.

Total area under the basin is about 5500sq. km.

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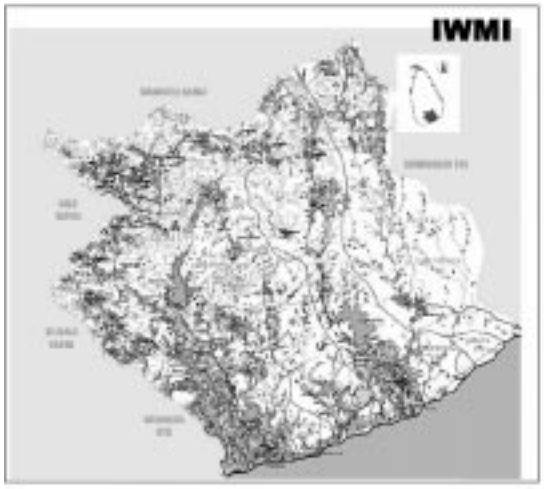

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Why Ruhuna Basins?

- *Familiar to IWMI*
- *Proposed Ruhunupura project area*
- *Diversity of climates*
- *Diversity of organizations*
- *Diversity of interest (agric. production, power generation, natural habitat etc.)*
- *More potential for future development (slower economic growth, higher unemployment rate)*
- *Competition for water - more future demands*
- *Uda Walawe basin is the only UNESCO-HELP basin in Sri Lanka*
- *Good living laboratory for IWMI*

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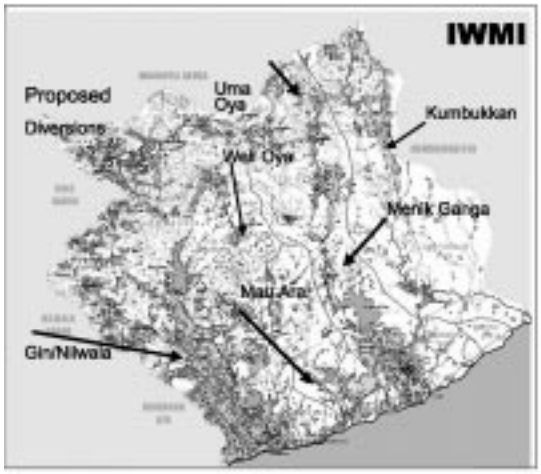

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Our Stakeholders

Government Departments , Ministries and Institutions

- Ministry of Irrigation and Water Resources
  - Department of Irrigation
  - Irrigation Management Division
  - Water Resources Secretariat
- Ministry of Mahaweli Development
  - Mahaweli Authority of Sri Lanka
- Ministry of Agriculture and Lands
  - Department of Agriculture
  - Department of Agrarian Services
  - Agriculture Development Authority
  - Hector Kobbekaduwa ARTI
- Ministry of Fisheries and Aquatic Resources Development
- Ministry of Health and Indigenous Medicine
  - Department of Health Services
  - Anti- Malaria Campaign
- Ministry of Forestry and Environment
  - Department of Forest
  - Central Environmental Authority
- Department of Meteorology
- Ceylon Electricity Board
- Department of Wildlife Conservation
- National Water Supply and Drainage Board
- Water Resources Development Board
- Southern Development Authority
- Universities - Peradeniya / Ruhuna / Sabaragamuwa
- Provincial Councils

Ruhuna and the World Water Assessment Program

Ranjith Ratnayake, Director, Ministry of Irrigation and Water Resources

Ranjit Ratnayake, briefed the participants on the planning for the Sri Lanka case study in the World Water Assessment Program (WWAP) supported by UNESCO (Appendix C). The Ruhuna Basin was chosen as the best area for the case study both because of the urgent issues to be addressed with growing water scarcity and the commitment of the Government to the development of the region. The main objective of the study is the assessment of the present status, critical issues, and water resource development potential of the Ruhuna Basin from a regional development perspective.

Ratnayake noted the complementarity of this study with the IWMI Ruhuna Benchmark Basin Program (RBBP). For example, the establishment of a readily accessible water resource database was seen as an initial step in both studies. It was hoped that UNESCO's commitment would be for the long-term. **It was recommended that one Advisory Committee be established to oversee the activities of both the WWAP and the RBBP.**

WORLD WATER ASSESSMENT PROGRAMME

by UNESCO

Human Water Stewardship

- Meeting Basic Needs
- Securing food supply
- Protecting eco-systems
- Sharing water resources
- Managing water related risks
- Valuing water economically
- Water for energy
- Water for industry
- Ensuring knowledge base

Global Water System

Critical Problems

RUHUNU RIVER BASINS

- Ruhunu river basins include Menik Ganga, Kirindi Oya and Walawe Ganga and other smaller streams
- Emphasis on Southern area development considered
- Contributing factors: IWMI's Benchmark Basin Program, studies planned by WRB, IMD, HELP initiative etc.

Basin	Catchment area (km2)	Annual precipitation Million m³	Annual discharge Million m³	Length km
Menik Ganga	1287	2098	484	114
Kirindi Oya	1178	1774	428	117
Walawe Ganga	2442	4577	2200	138
Total	4907	8449	3112	

STUDY IMPLEMENTATION

- Ministry of I&WRM would be the Focal Point
- Study Advisory Committee for Benchmark Basins would provide national level coordination
- A Study Team would carry out the study
- Selected items, including monitoring of indicators, carried out by consultants
- IWMI would be a Facilitating Agency

Responsibility Matrix (Provisional)

Task	MI&WRM	ID	IMD	WRB	WRS	Consultant	IWMI	WWAP Secretary
Prelim. Asset Base	X	X	X	X	X	X	X	
Data gaps						X		
Database						X	X	
Indicators	X	X	X	X	X	X	X	X
Scenarios	X	X	X	X	X		X	
Data Analysis						X		
Report						X		
Monitoring Indicator						X	X	
Coordination	X	X	X	X	X		X	

Stakeholders/ Contributing Partners

1. Southern & Uva Provincial Councils
2. Relevant District / Divisional Secretaries
3. Irrigation Department
4. Irrigation Management Division
5. Water Resources Board
6. Water Resources Secretariat
7. Mahaweli Authority of Sri Lanka
8. Department of Agriculture
9. Department of Agrarian Development
10. Department of Meteorology
11. National Water Supply and Drainage Board
12. Department of Wildlife Conservation
13. Southern Development Authority
14. Ministry of Fisheries & Aquatic Res. Dev.
15. Ceylon Electricity Board
16. Department of Health
17. Central Environmental Authority
18. Forest Department
19. Agriculture Development Authority
20. Anti-Malaria Campaign
21. National Universities
22. International Water Management Institute
23. NGO s

LINKAGES

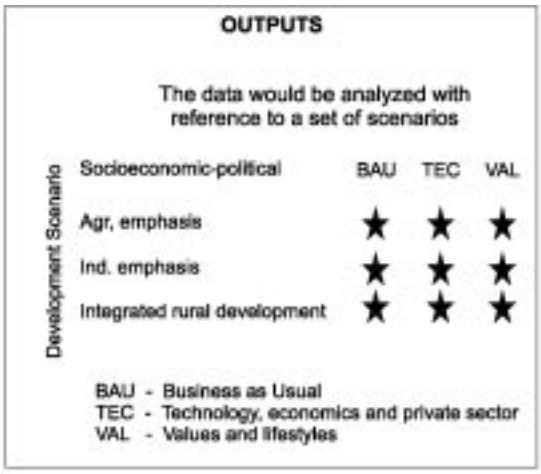
National Level Study Adv. Committee *

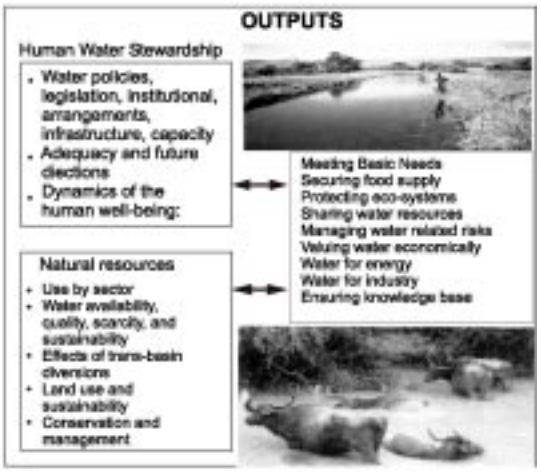
Provincial Admin.
District Admin.
Divisional Admin.
WRS/NWRA
Dept. of Agr.
Other Govt. Agencies
IWMI
NGO s
UNESCO and other UN Agencies

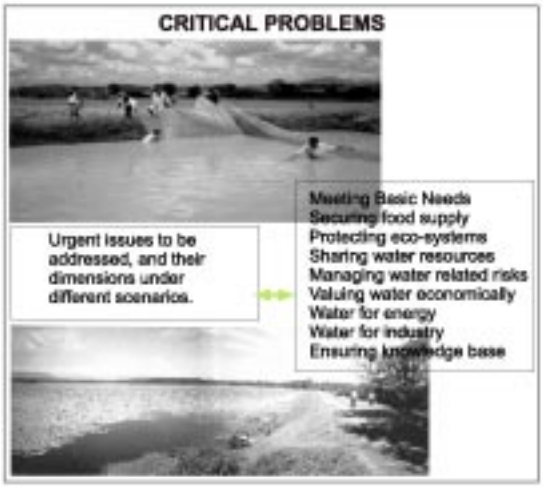
Case Study Group

ID IMD MASL MI&WRM

* UNESCO WWAP Study to link with mechanism for IWMI Benchmark Study







Department of Irrigation

H.M. Jayatilake, Deputy Director, Irrigation Management and Operations

The various types of data, data transmission methods, data transmission frequency and stages were discussed. The lack of availability of certain data was also noted. Cropping intensities and irrigation duties vary widely. Water savings in the Maha permit an increase in cropping intensity. Finally, he noted the procedures in place for systems management data and information availability and sharing.

Ruhuna Benchmark Basins Irrigation Department's Interests & Involvement

Eng. H M Jayatillake

Project Director (ISRP) &

Deputy Director (Irrigation Management)

ID's Mandate

- Water Resources Assessment
- Flood Control Works – Development & Management
- Irrigation – Development & Management
- Other related Activities
- Specified Areas

Water Resources Assessment

- Hydrology Division of ID Maintain a National Network of Hydrometry
- Data include:

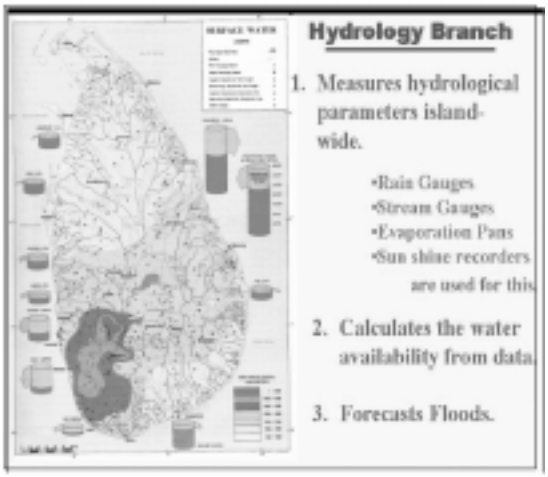
Rainfall	19 Stations
Evaporation	21 Stations
River Flows	41 Stations

Stations in Ruhuna Basins

- Kataragama in Menik Ganga Basin
- Wellawaya in Kirindi Oya Basin
- Panamure in Walawe Basin

Data & Information Availability

- Hydrological Annual
- Long-Term Data On Request



Irrigation Schemes

- Walawe Basin

  Kaltota

  Walawe LB & RB - Liyangastota Ridigama

  Weli Oya, Mau Ara under Construction

  Others

  Management Links with Uda Walawe & Samanala Wewa

Kirindi Oya Basin

- Sudupanawela
- Handapanagala
- KOIS Complex
- Others

Menik Ganga

- Horabokka
- Pelwatte
- Kukurampola
- Buttala
- Others

Systems Management Data & Information

- Irrigation Management Branch (ID)
- Objectives:
  - Make Managers just feel that somebody is watching
  - Real Time Management
  - Benchmarking & Performance Improvement Interventions
  - Planning

Data Type Basic Processed Data

Inflow Diversion	Water Level / Discharge
Storage	Water Level / Storage
Water Issues	Water Level / Discharge

Cropping Data

Calendar

Crop Type

Cropped Area

Growth Period

Water Issue Period

Hydro/Agro Metrological Data

- Rainfall
- Evaporation

Flood Data

- Flood Level
- Spill Discharge & Duration

Coverage Major, Medium Irrigation Systems Under ID

- Major Reservoirs
  - Extent Over & Around 1,000 Acs (400ha)
  - 95 Schemes
- Medium Reservoirs
  - Extent 200 to 1,000 Acs (80 ha – 400 ha)
  - 94 Schemes
- Anicut Schemes
  - 79 Schemes

Data Transmission Frequency

- Hourly
- Six Hourly
- Daily
- Weekly
- Monthly
- Beginning of Season
- End of Season

Transmission Method

- Hand Delivery
- Bicycle
- Motor Bicycle
- Vehicle
- Post
- Telephone
- Fax
- e-mail

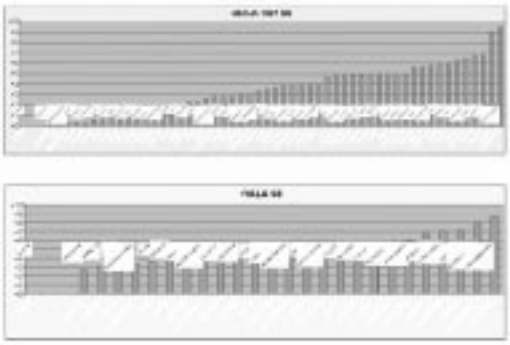
Transmission Stages

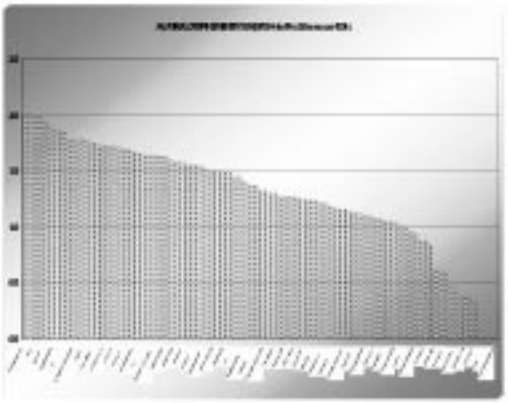
- Site to Division
- Division to Range
- Division to Centre
- Range to Centre

Benchmarking & Performance Improvement

- Performance Evaluation
- Sore-Thumb Analyses
- Improvement Interventions

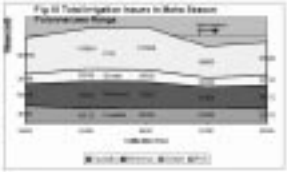
Irrigation Duties



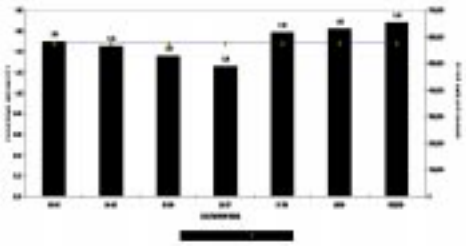


Water Savings - Maha

- 20% – 30%
- Enough for 7200 Ac
- Worth Rs. 130mil per season



Irrigation Department
All Island Cropping Intensity & Gross Extent - Schemes over 1,000 Acs (400 ha) 1993/1994 to 1999/2000



Systems Management Data & Information - Availability & Sharing

- Water Availability and Use Data published in Monthly Bulletin of HARTI
- Shares with Agriculture Department, HARTI for Crop Forecasting & Market Intelligence

Mahaweli Authority of Sri Lanka (MASL)

M.D. Piyathilake, Deputy Resident Manager (Agriculture) Embilipitya

The Walawe Basin is one of the most highly diversified agricultural systems in Sri Lanka. Paddy and other perennial crops like banana, papaya, sugar cane and other horticultural crops are grown under irrigation. The area in non-paddy crops has grown from 4 percent in 1986 to 40 percent at present. A quarter of the cultivated area if for bananas. Valuable suggestions for better water management included: (i) shift from seasonal paddy to year round crops, (ii) development of water saving irrigation methods and micro irrigation systems, (iii) development of effective water user organizations.

The goal of MASL is to change the traditional subsistence farmer to a 21st Century business farmer.

BANANA KINGDOM

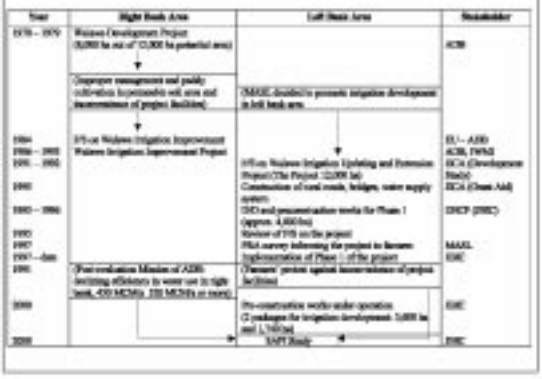
OF

SRI LANKA

M. D. Piyatillake

WALAWE LEFT BANK IRRIGATION UPGRADING AND EXTENSION PROJECT

Historical Background



Organization of MASL at present (as of November 1999)

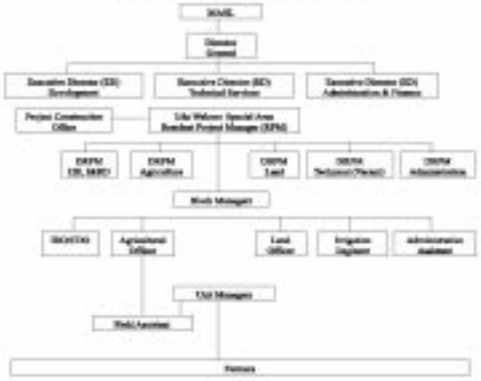


Figure 3.3.2.1 Present Organization for Operation and Maintenance of Walawe Project (Right and Left Bank)

WALAWE AGRIC IMPORTANCE

Tank capacity	217000 Acre feet
Irrigable area	14281 Ha
Average rainfall	960 mm/year
Humidity	75 – 81%
Temperature	26 – 33 C

District	A.G.A. Division
Ratnapura	Embilipitiya
Monaragala	Thanamalwila
Hambantota	Angunakolapelassa
	Ambalantota
	Suriyawewa

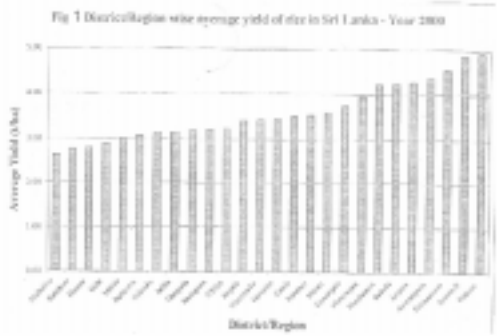
WALAWE AGRIC IMPORTANCE

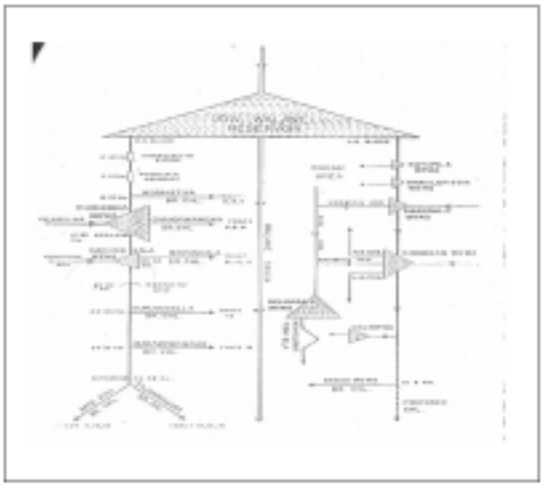
PADDY	*Highest yield in Sri Lanka *3-3 ½ month varieties
BANANA	*Largest growing area under irrigation *Permanent diversification
FRUIT	*Highly potential area
VEGETABLES	*Mainly low country
MILK	*Producing area

Paddy Yield Performance

Season	Area ha	Yield MT/ha	National rank
1990 yala	10,849	4.8	1
1991 yala	10,103	4.2	1
1992 yala	1,327	3.9	1
1993 yala	9,529	4.7	1
1994 yala	9,885	4.6	1
1995 yala	9,713	4.6	1
1996 yala	8,053	4.3	2
1997 yala	9,023	4.9	1
1998 yala	7,219	4.7	1
1999 yala	7,657	4.6	1
2000 yala	8,804	4.8	

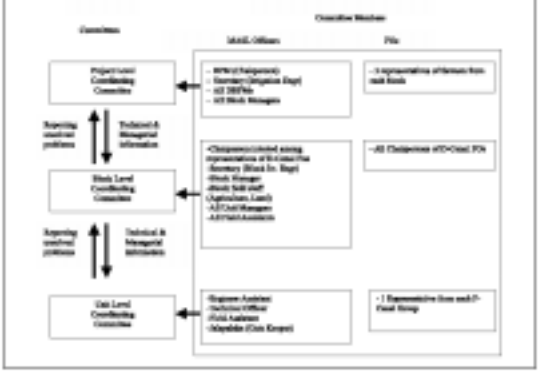
Figure 1. District/Region wise average yield of rice in Sri Lanka-Year 2000





Salient Features of the Project

Present Coordination Mechanism of Participatory Management



Land Extent and Number of Facilities of the Walawe Project

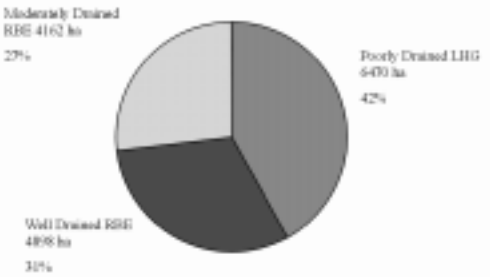
Block	Total Area (Ha)	Irrigable Area (Ha)	Number of families
Chandrikawewa	18541.5	3546.8	14366
Marawaththa	7944.6	4490.0	6109
Angunakolapelessa	4245.5	3132.0	4384
Kirthibawewa	2068.0	1867.0	4170
Suriyawewa	4245.5	2548.3	6868
Project	28046.1	14584.1	35897

FARMER ORGANIZATIONS	CW	MW	AMK	KW	SW
Field Canal Groups (FCG)	287	467	378	133	195
D- Canal Groups (DG)	33	33	44	18	18
Unit Coordinating Com. (UI)	95	95	84	84	95
Block Coordinating Com. (BI)	81	81	81	81	81
Project Coordinating Committee (PI)					

Features of the Project

		Phase 1		Phase 2	Total
		Upgrading	Extension	Extension #1	
A. Irrigation Development					
1. MIA Area	a. Kirindaoya	1,480 ha	-	-	1,480 ha
	b. Suriyawewa	1,420 ha	1,040 ha	-	2,460 ha
2. Extension Area		-	-	5,340 ha	5,340 ha
Total		2,900 ha	1,040 ha	5,340 ha	9,280 ha
B. Rural Infrastructure Development		Development Center Upgrading and construction of Pola		Development of basic infrastructures in 12 new villages	
C. Environmental Monitoring		Monitoring of the quality of soils and water Development of fuelwood forest		Monitoring of the quality of soils and water Implementation of mitigation measures for wild elephant	
D. Training		Guidance to project staff and farmers on O/M of irrigation facilities		Guidance to project staff and farmers on facility designing, O/M of facilities and water management	
E. Others		Procurement of O/M equipment and vehicles		- do -	

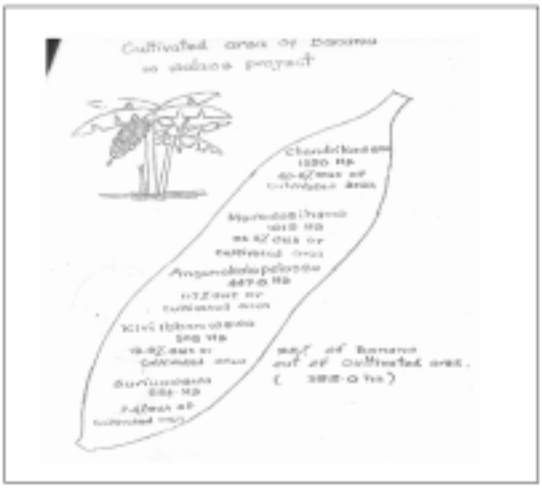
Distribution of soils in Walawe Project



Crop Diversification Progress (ha)

CROP	PADDY	BANANA	OFC EX. BANANA	OFC	TCA	OFC/TCA%
86 YALA	11465	331	314	360	12010	4.30%
87 YALA	10360	351	337	688	11001	5.31%
88 YALA	10596	411	275	686	11272	6.09%
89 YALA	10847	479	402	878	11725	7.49%
90 YALA	10716	892	421	1313	12029	10.92%
91 YALA	10875	1114	713	1827	12800	14.27%
92 YALA	10480	1485	1272	2757	13237	20.83%
93 YALA	10429	1833	1115	2948	13375	22.03%
94 YALA	10116	2406	852	3258	13374	24.36%
95 YALA	9717	2882	1452	4334	13751	29.33%
96 YALA	8892	2708	1707	4416	13308	33.18%
97 YALA	9021	3032	1237	4269	13290	32.13%
98 YALA	7219	3238	1118	4356	11574	37.62%
99 YALA	7642	3689	962	4651	12293	37.8%
00 YALA	6805	3475	1234	4709	11512	34.9%
01 YALA	7334	3812	1458	5262	12596	48.3%

TCA - TOTAL CULTIVATED AREA



Walawe Banana

*Largest irrigated Banana Growing Area in Sri Lanka

* Present area	-	3812.0 ha
*Banana Farmers	-	8000
*Contribution to national production	-	Rs 1000 million per year
*Indirect employment	-	3000

*Future development targets
- Cultivation area 5000 ha
- Develop farmer groups
- Tissue culture plant production
- Banana processed foods
- Investment promotion
- Banana development foundation
- Special demonstration program for Banana Anguinolepteless - 100 farmers

Your valuable suggestions for better water management

1. Seasonal cultivation (Paddy)

   ↓

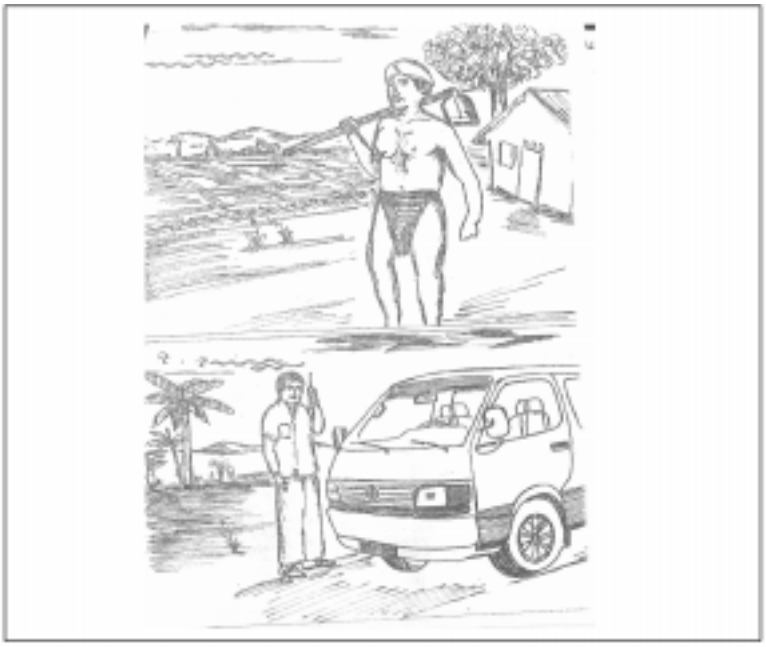
   Year round cultivation (other crops)

   ↓

2. Surface irrigation

   water saving irrigation

3. Construction and maintenance of sustainable beneficiaries organizations (human engineering)



Department of Wildlife Conservation

H.D. Ratnayake, Deputy Director, Development and Management

The Department's mission is to integrate bio-diversity conservation with social and economic development based on wildlife and natural resources. Its main objective is the conservation of wildlife resources and to create greater public awareness of wildlife. Its policy is conservation, sustainable use, and benefit sharing. Some of the management problems include: desanitation, overfishing of lagoons, livestock overgrazing, preservation of exotic plants, use of land for salt production, poaching of animals and turtle eggs, illegal shell mining, illegal woodcutting, elephant-human conflicts, protection of park boundaries, and lack of road networks.

DEPARTMENT OF WILDLIFE CONSERVATION

Ratnayake

VISION

Integrating bio-diversity conservation with social and economic development based on wildlife and natural resources

OBJECTIVES

1. Function according to the National Wildlife Policy Conservation/Sustainable use/Benefit sharing
2. Management and administration of wildlife protected areas and wildlife resources
3. Enforcement of Fauna and Flora Protection Ordinance and make amendments to the Act as and when necessary
4. Implementation of International Wildlife Conventions in Sri Lanka
5. Control of import ant export of Fauna and Flora and their products
6. Conduct and coordinate research on wildlife to ensure their survival
7. Conduct awareness programs on wildlife conservation.

NATIONAL WILDLIFE POLICY

The first National Wildlife Policy was adopted in June 1990 and revised in June 2000, which was approved by the cabinet.

Aspects:

Conservation
Sustainable Use
Benefit Sharing

OBJECTIVES OF THE NATIONAL WILDLIFE POLICY

1.1 To conserve wildlife resources, through protection, research education, sustainable use and benefit sharing, for the benefit of present and future generation
1.2 To maintain ecological processes and life-sustaining systems, with particular regard to primary production, hydrological balance, nutrient cycles, and prevention of soil erosion, siltation, drought and flood control
1.3 To manage all components of genetic diversity, as resources to improve crop plants and farm animals, and to develop in a fair and equitable manner of new product and processes through bio-prospecting
1.4 To ensure sustainable use and equitable sharing of benefits, arising from the direct and indirect use of wildlife resources and ecosystems
1.5 To conserve native and endemic species and their habitats, so as to maintain the overall species richness and ecological integrity of the country
1.6 To encourage the development of biological repositories, for the purposes of conservation, education and science
1.7 To encourage the private sector and communities to join as full partners in all aspects of the wildlife conservation process.

MANAGEMENT PROBLEMS

1. De-salitation due to the discharge of excess irrigation water
2. Excessive lagoon fishing
3. Excessive livestock grazing
4. Disposal of exotic plants *Opuntia dilleni* & *Prosopis juliflora*
5. Land use for the salt manufacture
6. Poaching of sea turtle eggs
7. Illegal shell mining
8. Poaching of animals
9. Illegal woodcutting
10. Elephant-human conflict
11. Park boundaries problems
12. Lack of road networks for protection and management

MANAGEMENT OBJECTIVES (DETAILS)

1. To optimize the salinity regime of over half of the Bundala lewsys, which is not under salt manufacture
2. To restore the salinity regime of Malala lagoon by regulation of inflow of surplus irrigation discharge, as well as facilitate its contact with sea
3. To provide for a direct exit from the lagoon to the of the heavy irrigation discharge flowing into Embilikala, with arrangement for regulated diversion of freshwater to Malala
4. To provide for and manage compatible use of the designated beaches by local fishermen who sail from these beaches into the sea for fishing
5. To eliminate livestock grazing from the scrub-grass habitats by providing alternatives to the local villagers dependent on this practice
6. To manage these habitat for suppression of exotics and weeds e.g. *Prosopis juliflora* and *Opuntia dillenii*
7. To strength staff at different levels for effective protection and management.
8. To add infrastructure and equipment direly needed for effective protection and management

9. To ensure well-organized deployment of the enhanced staff cadres into appropriate territorial/functional units for effective protection and management
10. To augment infrastructure for and improve the organization of visitor excursions so as to reduce disturbance and enhance visitor satisfaction
11. To provide for the care of archaeological sites allowing only controlled visitation
12. To facilitate the local fisherman as recognized stakeholders in sea fishing by devising and implementing measures in a participatory manner with them
13. To wean them from lagoon fishing except in one permitted lagoon as part of the participatory evolved package, which facilitates the far more remunerative sea fishing
14. To facilitate local cattle farmers in adopting sustainable practices, with reduced numbers of more productive livestock that sustain on alternative resources created outside the park
15. To provide alternatives for domestic energy to the local people in order to wean them from cutting native trees and shrubs for firewood
16. To ensure that the package of eco-development measures in both the cases yield higher economic benefits to the identified real stakeholders pursuing these vocations for sustenance

MANAGEMENT PLANS FOR WILDLIFE PROTECTED AREAS

1. Yala protected area complex
2. Udawalawe National Park
3. Bundala National Park
4. Lunugamvehera National Park
5. Peak Wilderness Sanctuary
6. Minneria National Park, Minneria-Giritale Nature Reserve & Sigiriya Sanctuary
7. Ritigala Strict Nature Reserve
8. Wasgomuwa National Park & Riverine Nature Reserve
9. Victoria-RandenigalaRantambe (VRR) Sanctuary

Management strategies for the conservation of elephants and mitigation of human-elephant conflicts

MAJOR AREAS COVERED BY THE MANAGEMENT PLANS

PART I - Existing Situation

Chapter 1: Introduction to the area

Chapter 2: Background information and attributes

Chapter 3: History of past management and present practices

Chapter 4: The protected area and the interface land use situation

PART II - Proposed Management

Chapter 5: Plan objectives and problems (Management goals of protected area, management objectives and problems in achieving objectives)
Chapter 6: The management strategies (Legal status, boundaries, management issues, relationships between objectives and problems as basis for strategies, zones and themes approach to organizing management strategies, management zoning, management themes and other plan features)
Chapter 7: Zone plan for strict conservation zone
Chapter 8: Zone plan for coast conservation zone
Chapter 9: Zone plan for intensive management zone
Chapter 10: Zone plan for eco-development zone
Chapter 11: Zone plan for tourism and cultural zone
Chapter 12: Mitigation of genetic contamination of wild buffalo
Chapter 13: Research, monitoring and training
Chapter 14: Organization, protection and administration
Chapter 15: Schedule of Operations and Budget

PART III - Appendices

Maps, Tables, Figures and Check Lists

The National Water Supply and Drainage Board (NWSDB)

Nalin Wickrematunge, Asst. General Manager (S)

The NWSDB has 12 water supply schemes in the Hambantota District. NWSDB service connections and stand posts now serve 40 percent of the population while the target in 2020 is 55 percent. Tube wells serve another 16 percent of the population, protected dug wells 12 percent, with the remaining 30 percent obtaining water from other largely unprotected sources. There are eight projects in the district three of which have been recently completed. NWSDB is planning to develop a water study in Hambantota District with JICA support.

WATER SUPPLY IN HAMBANTOTA DISTRICT

PRESENTED BY

National Water Supply & Drainage Board

Contents

GENERAL INFORMATION - SOUTHERN PROVINCE (As at December 2000)

ITEM	GALLE	MATARA	HAMBANTOTA	SOUTHERN	SOWPD
Population	1,065,000	810,000	542,000	2,403,000	18.9m
Schemes	12(1+11)	12(9+10)	18(8+10)	42(18+24)	263
Full TP	2	3	3	8	30
LAA Schemes	-	15(3.2%)	32.1%	14(1.8%)	276
Av Daily Production	27,000 cum	50,000 cum	27,000 cum	80,000 cum	0.03 bcm
No of connections	37,730	31,730	23,003	84,470	984,200
Stand Posts	250	140	1,050	1,440	12,130
Wells	73	229	882	1,184	12,000
NWSDB Coverage	14.7% + 0.7%	20.3% + 2.8%	38.8% + 18.3%	23.7% + 4.8%	30%
Staff (O&M)	231	324	267	822	5,888

WATER SUPPLY IN HAMBANTOTA DISTRICT

Population and Land Distribution

NO	DISTRICT SECRETARIAT DIVISIONS	POPULATION IN 1998	HOUSE UNITS	LAND AREA (Sq. Km)	POPULATION DENSITY PER (Sq. Km)
1	Hambantota	47,158	11,188	319	148
2	Ambalantota	86,178	12,647	248	347
3	Tissa	66,778	14,634	833	80
4	Lunugamvehera	27,628	5,947	224	123
5	Sooriyawewa	34,158	7,867	158	216
6	Angunakolapelessa	43,685	8,174	176	247
7	Tangalle	68,758	14,858	153	448
8	Beliatta	53,598	11,178	98	545
9	Katuwana	63,448	13,311	169	375
10	Okewela	20,638	4,056	39	527
11	Weerakatiya	33,123	10,488	176	314
	TOTAL	538,845	115,611	2,584	209

Extracted from District Secretariat Office - Hambantota

SERVICE COVERAGE OF NWSDB

MODE OF SERVICE	NOS	SERVICE COVERAGE
SERVICE CONNECTIONS	25,330	22%
STAND PIPES	1,830	17%
TOTAL COVERAGE		40%

SERVICE COVERAGE

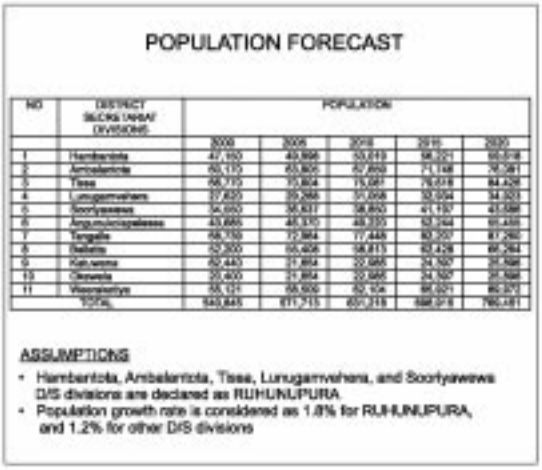
AUTHORITY	NOS	SERVICE COVERAGE
SCHEMES UNDER NWSDB	18	42%
SCHEMES UNDER LAA	3	2%
TUBE WELLS UNDER LAA	882	16%

TOTAL WATER SUPPLY COVERAGE IN HAMBANTOTA DISTRICT

SOURCE OF SUPPLY	PERCENTAGE
PIPE BORNE WATER	42%
TUBE WELLS	16%
PROTECTED DUG WELLS	12%
UNPROTECTED DUG WELLS	
OTHER SOURCES	30%

STATUS OF WATER SUPPLY IN NWSDB AS AT DECEMBER 2000

NUMBER OF SCHEMES	18
AVERAGE PRODUCTION	27000 Cum PER DAY
UFW	32%
NUMBER OF CONNECTIONS	25,330
NUMBER OF STAFF	300
AVERAGE PRODUCTION COST	Rs. 9.60 per Cum
AVERAGE SUPPLY COST	Rs. 14.30 per Cum
OPERATION & MAINTENANCE COST	Rs. Mill 89 PER YEAR
REVENUE	Rs. Mill 83 PER YEAR
REGIONAL LOSS	Rs. Mill 6 PER YEAR



POPULATION FORECAST

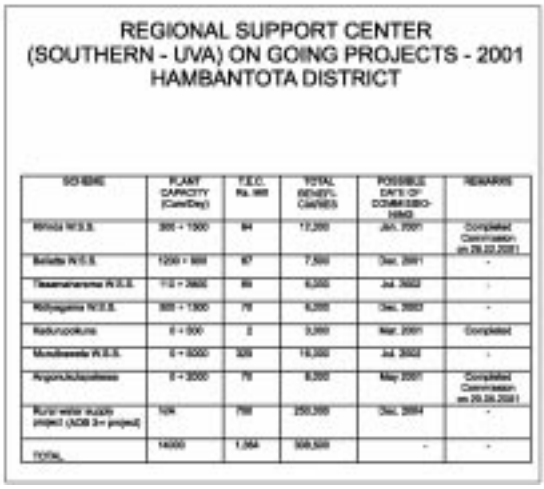
NO	DISTRICT (SLCRG/AMBAT DIVISIONS)	POPULATION				
		2000	2005	2010	2015	2020
1	Hambantota	47,150	49,996	53,019	56,221	59,618
2	Ambalantota	63,170	65,805	67,892	71,148	75,381
3	Tissa	68,770	70,804	75,081	79,618	84,426
4	Lunugamvehera	27,820	29,268	31,008	32,904	34,923
5	Sooriyawewa	34,950	36,837	38,850	41,187	43,588
6	Angunakolapelessa	43,886	46,130	48,700	52,264	55,444
7	Tangalle	68,150	72,864	77,448	82,700	87,960
8	Beliatta	57,300	60,406	64,813	62,428	66,264
9	Kataragama	62,440	71,864	77,886	84,527	91,588
10	Okewela	20,400	21,864	22,886	24,527	26,588
11	Weerawila	58,121	68,500	62,104	66,021	69,973
	TOTAL	543,845	571,715	601,318	646,018	700,161

ASSUMPTIONS

- Hambantota, Ambalantota, Tissa, Lunugamvehera, and Sooriyawewa D/S divisions are declared as RUHUNUPURA
- Population growth rate is considered as 1.8% for RUHUNUPURA, and 1.2% for other D/S divisions

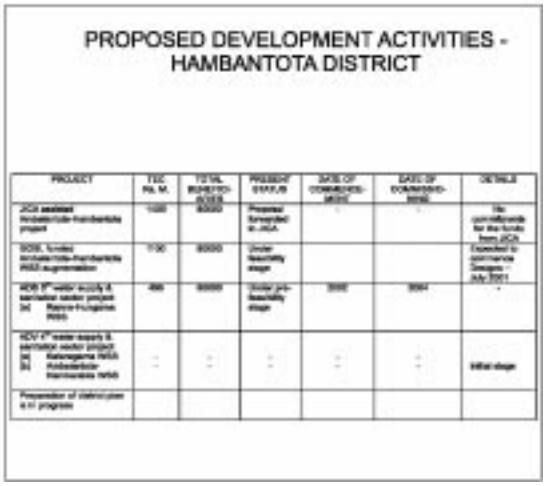
WATER DEMAND FORECAST

DESIGN CRITERIA	2000	2005	2010	2015	2020
Total population	543,845	571,715	601,318	696,915	700,161
Coverage (%WSSR)	40%	42%	45%	50%	55%
Domestic Demand (Cum/Day) assuming 140 – lpcd	30,387	33,617	39,767	48,784	59,348
Commercial Demand (Cum/Day) assuming 10% of the domestic demand	3,029	3,362	3,977	4,878	5,935
Migrants for recreation (Cum/Day) assuming 5% of the domestic demand	1,514	1,681	1,988	2,439	2,962
Religious, Govt. schools and others assuming 5% of the domestic demand	1,514	1,681	1,988	2,439	2,962
Harbour demand for RUHUNUPURA	Concept not yet finalized				
Airport for RUHUNUPURA	Concept not yet finalized				
Industrial Demand for RUHUNUPURA	Concept not yet finalized				
Total Cum per day	36,345	40,340	47,720	58,541	71,007
UFW – 25%	12,115	13,447	15,907	19,514	23,699
Total demand Cum/day	48,460	53,787	63,627	78,054	94,706
Total demand mgd	11	12	14	17	21
Total demand Cum/sec (Cu.sec)	0.42	0.47	0.55	0.68	0.82



REGIONAL SUPPORT CENTER (SOUTHERN - UVA) ON GOING PROJECTS - 2001 HAMBANTOTA DISTRICT

SCHEME	PLANT CAPACITY (Cum/Day)	T.E.C. Rs. Mill	TOTAL BENEFI-CIARIES	POSSIBLE DATE OF COMMISSIO-NING	REMARKS
Mihinda W.S.S.	300 + 1500	84	17,000	JAN. 2001	Completed Commission on 28.02.2001
Beliatta W.S.S.	1200 + 900	67	7,500	Dec. 2001	-
Thissamaharama W.S.S.	112 + 2600	89	8,000	Jul. 2002	-
Mattegama W.S.S.	300 + 1300	78	8,000	Dec. 2002	-
Ratkurupokuna	0 + 600	2	3,000	Mar. 2001	Completed
Mundaweela W.S.S.	0 + 3000	328	18,000	Jul. 2002	-
Angunakolapelessa	0 + 3000	78	8,000	May 2001	Completed Commission on 20.06.2001
Rural water supply project (ADB 3= project)	104	798	250,000	Dec. 2004	-
TOTAL	14000	1,564	326,500	-	-



PROPOSED DEVELOPMENT ACTIVITIES - HAMBANTOTA DISTRICT

PROJECT	TEC Rs. M.	TOTAL BENEFICI-ARIES	PRESENT STATUS	DATE OF COMMENCE-MENT	DATE OF COMMISSIO-NING	DETAILS
JICA assisted Hambantota-Hambantota project	1100	80000	Proposal forwarded to JICA	-	-	No commitments for the funds from JICA
SCSL funded Hambantota-Hambantota RWS augmentation	1130	80000	Under feasibility stage			Expected to commence Designs - July 2001
HDV 1st water supply & sanitation water project (a) Ranna-Kongalegama basin	486	80000	Under pre-feasibility stage	2002	2004	-
HDV 1st water supply & sanitation water project (a) Kataragama RWS (b) Ambalantota-Hambantota RWS	- -	- -	- -	- -	- -	Initial stage
Preparation of district plan is in progress						

Agrarian Services Department

Prabath Witharana, Engineer

The Department provides services and support for 30,000 village irrigation works based on small tanks and shallow ground water installations. This includes improving the overall efficiency of the tank system by deepening of tanks and other measures. The main focus is on irrigation and water management research and training and solutions to the crisis in village irrigation are a main focus. Database management is a major task but there is a lack of data and time for database processing. The Department sees as its goal or vision the introduction of appropriate technology, development of a knowledge database, and opening up of new avenues for land and water management.

Department of Agrarian Services

VISION

&

THE MISSION

Started on 1st of October 1957

- Paddy Land Act in 1958
- Take care of 30,000 Village Irrigation Works.
- Water Management Division started in 1980 to undertake special projects.

NEW ACT 2000/46
Agrarian Development Act

- Department of Agrarian Development (DAD)
- Since August 18th 2000.

MAIN OBJECTIVES ARE

- * AGRICULTURAL LAND TENANCY
- * IMPLEMENTATION OF GOVERNMENT POLICY
- - EFFICIENT LAND MANAGEMENT
- - LAND BANK
- - AGRICULTURAL CONFLICT MANAGEMENT
- - FARMERS' ORGANIZATIONS

FARMERS' ORGANIZATIONS

- FORMATION
- NEED ASSESMENT
- CAPACITY BUILDING
- TECHNICAL INPUTS
- COORDINATION
- LEGAL RECOGNITION
- TRAINING
- MONITORING

IRRIGATION WATER MANAGEMENT

- *GUARDIAN OF VILLAGE IRRIGATION
- *CUSTOMARY LAWS & TRADITIONS
- *SURFACE IRRIGATION
- *SHALLOW GROUNDWATER

Protection

- *RESERVATIONS
- *BUFFERS
- *SOIL QUALITY
- *WATER QUALITY

Research & Training

- Water balance Model
- Indigenous & appropriate Technology
- Training Units

Crisis in Village Irrigation

- Main Problems
- High maintenance cost
- 70%-Own labour
- 30%- Finance Rs.1000 / year

Innovative Approach Solution one

- GABIONS for water retaining structures.
- Properties
- Low cost
- Flexible
- Light weight
- Low maintenance cost
- For weak foundations

- TYPES
- Boxes
- Renometress
- Terramesh

- Dematapitiya Anicut in Rambukkana D.S area.

SOLUTION 2 Fiber Glass (FRP) Gates

- Alternative for wood
- Durable
- Availability

- CSM
- &
- WR
- Rib designs

Low conveyance efficiency

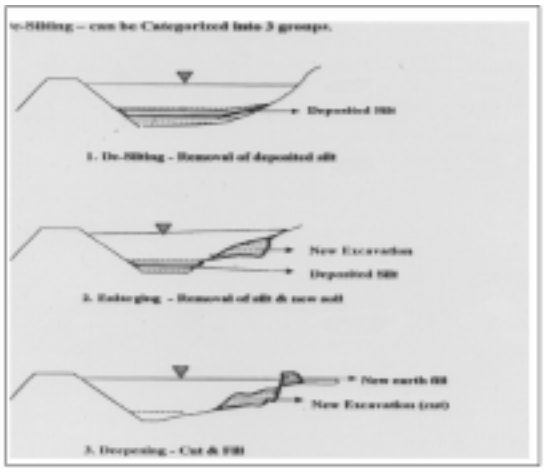
- Solution 3
- Pre cast half round concrete lining
- Ex: Godagandeniya Tank in Rambukkana D.S area

- Solution 4
- Soil cement lining
- Ex: Gamankumbura Anicut in Galigamuwa D.S area.
- HDPE liners...?

Tank Deepening

- Problem
- Scarcity of Water
- Low Water Efficiency

- Solution 6
- Tank deepening type 1,.2 &3.

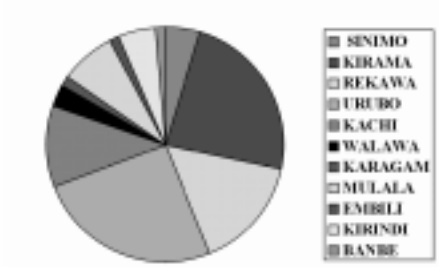


Database Management

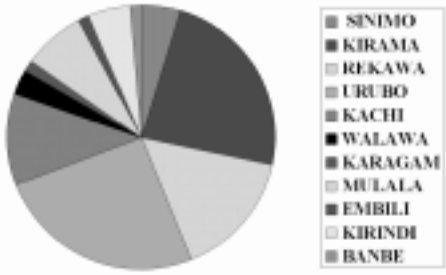
- Problem
- Lack of reliable database
- Time lag
- Lack of Data Sharing

- Solution 5
- Village Irrigation Data Base with 28/68 attributes.
- Attribute data
- GIS for Spacial
- & Temporal data
- Real Time Data Processing System …

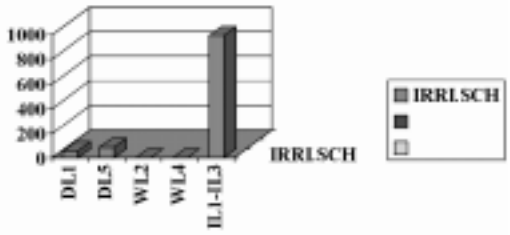
River Basins Vs Area for Hambantota District



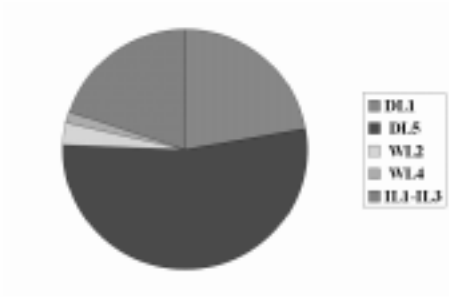
RIVER BASINS VS VILLAGE TANKS



AE Regions Vs Villave Tanks in Hambantota District



AE Regions Vs Area % in Hambantota District

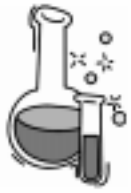


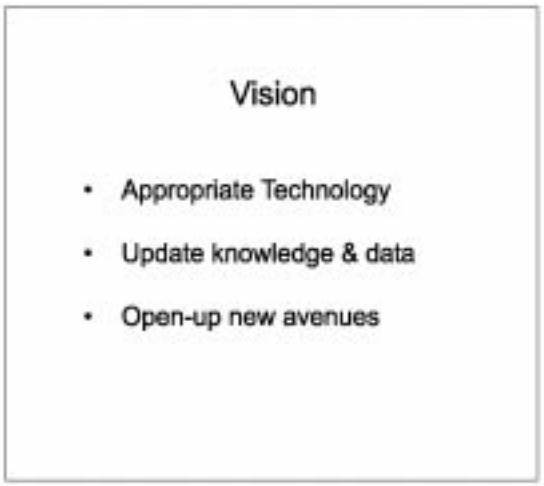
Validation of Data

- Satellite Technology
- Global Positioning System (GPS)
- Ground Control and Geo-Reference.

Material Testing Laboratory

- Civil Engineering
- Agronomy
- Tank Deepening





Department of Agriculture

H.D. Sumanaratne, Research Officer, Angunukolapalessa

The major technical divisions of the Department of Agriculture deal with research/education/ training/extension and provision of planting materials to farmers. The general crop categories are paddy, OFCs (legumes, cereals, oil crops etc.), and horticulture and vegetable crops. The department is concerned with the farm-level management and productivity of water and other resources under both rain-fed (chena cultivation) and irrigated conditions. Major objectives include proper land development, reduced wastage and improved productivity of water, introduction of pressure irrigation systems.

DATA BASE
Department of Agriculture

Department of Agriculture

- Major technical divisions
  - Research
  - Education/training/extension
  - Farms/planting material
- Crop categories
  - Paddy
  - OFC (legumes, cereals, oil crops)
  - Horticulture and vegetables

Land & water management

- Watershed (before streams)
  - upper part
- On-farm (after farm gate)
  - lower end

Land

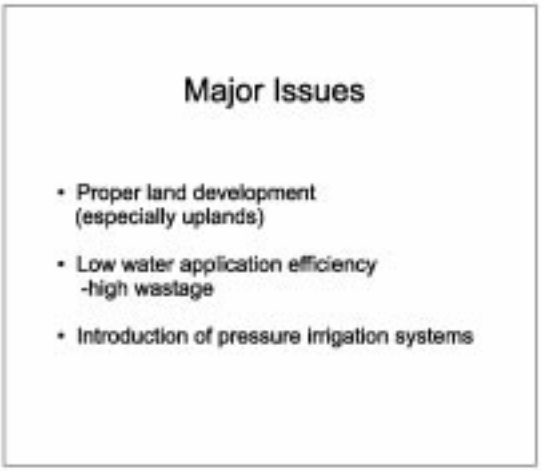
- climate
- soil
  - physical
  - chemical
- hydrology (drainage)
- topography
- use/extent

Water - 1

- Rain-fed (75-80%)
  - crop
  - season
  - establishment

Water - 2

- Irrigated agriculture
  - water source and quality
    - major
    - minor
    - well
  - irrigation systems
    - controllability / suitability for diversification
    - pumping/gravity
  - on-farm
    - crop
    - water requirement
    - irrigation scheduling
    - irrigation method/ related aspect



Southern Development Authority (SDA)

G. W. Samson, District Director

The SDA's main objective is to enhance the living standards of the people in the region. For this purpose they have set up the following eight sections: (i) human resource development, (ii) infrastructure, (iii) agriculture, (iv) plantation, (v) industries, (vi) fisheries, (vii) marketing and supply, and (viii) planning. The Department is now concentrating on vocational training programs, improvement in minor irrigation tanks, supplying plants and seeds for home gardening, improvement in traditional industries like jewelry, blacksmith, and pottery, improvement in fish production, and provision of sanitary facilities.

International Water Management Institute (IWMI)

Dr. Felix Amerasinghe, Principal Researcher

Good health is vital because sick farmers cannot keep up with the farm work. "Sick farmers do not grow much rice." Some of the major health problems or issues involve nutritional status, malaria incidence and vector-borne diseases, diarrheal diseases and chemical pollution. The degree of risk has been identified by type of drinking water source with wells having low level of faecal coliforms compared to canals and tanks but a high level of chemical pollution. Risk mapping has been undertaken in Udawalawe showing over time (1991 to 2000) areas of highest and lowest incidence of malaria. The most important and easily measured benchmark health indicators are nutritional status, malaria incidence, and pesticide poisoning.

Water & Health

PROTOZOA
HEPATITIS
Salmonella
WORMS
PESTICIDES
WATER QUALITY
Giardia
FILARIASIS
Shigella
SCHISTOSOMIASIS
SANITATION
BACTERIA
MALARIA
FLUORIDE
FLUKES
Viruses
ONCHOCERCIASIS
ARSENIC
JE
Entamoeba
SKIN
IRON
EYE
SALT
FERTILIZERS

WHY HEALTH?

The benefits of agriculture cannot be fully realized unless the health of farmers is safeguarded (Sick farmers do not grow much rice).

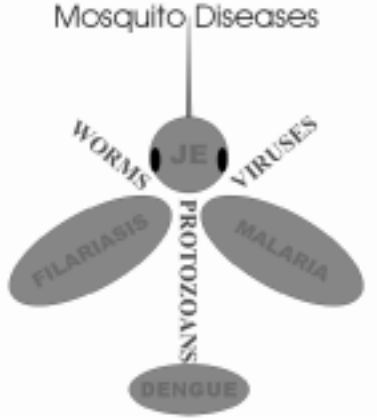
WHY ENVIRONMENT?

Natural resource areas provide goods and services, provide refuge for useful flora and fauna.

Some Issues

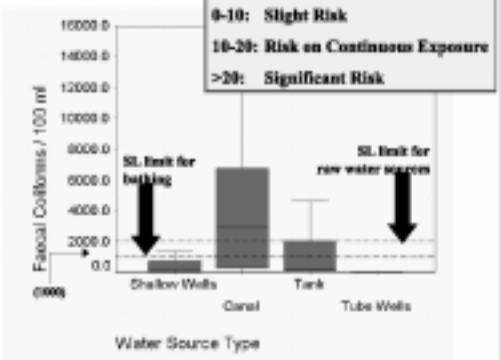
- VECTOR-BORNE DISEASES
- DIARRHEAL DISEASES
- CHEMICALS

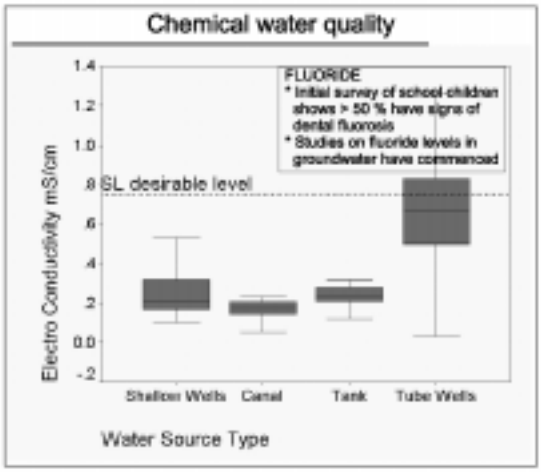
Mosquito Diseases

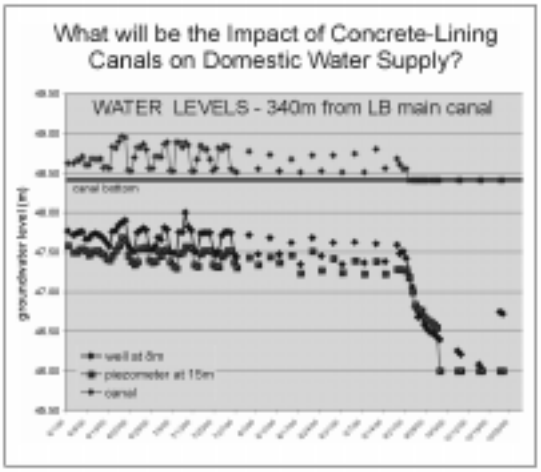


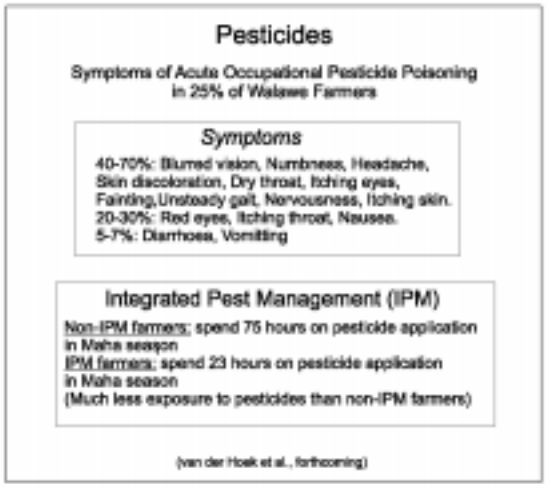
Risk mapping for Udawalawe

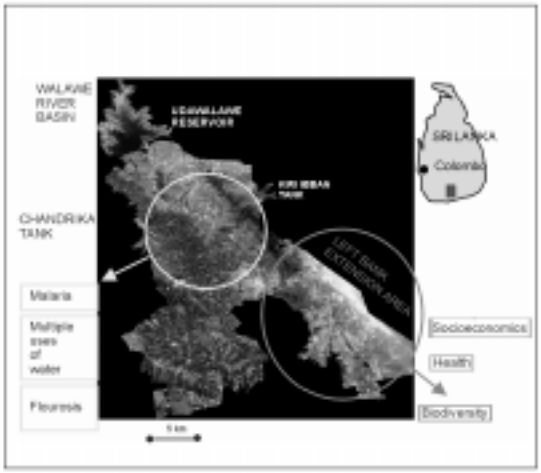
Biological water quality











Uda Walawe Basin Benchmark Health Indicators

NUTRITIONAL STATUS (Height for Age; Weight for Age) ★

MALARIA INCIDENCE ★

PESTICIDE POISONING ★

DIARRHEAL DISEASE INCIDENCE ?

LEPTOSPIROSIS ?

Department of Irrigation – Irrigation Management Division (IMD)

S. A. P. Samarasinghe, Director, Irrigation Management Division

The IMD was set up to implement the program on Integrated Management of Irrigation Agricultural Settlements (INMAS) initiated in 1984. The structure of IMD highlights the main objective of INMAS with a strong focus on participatory irrigation management. In addition, the IMD also promotes crop diversification, better farm management practices, and improved water management practices in systems that have been selected for the INMAS program. So far 38 systems are under the INMAS program or a little over a quarter of the total irrigated area which accounts for 40 percent of the countries paddy production. As a pilot study, comprehensive program of irrigation management transfer (IMT) has been implemented in one of the 38 systems.

Irrigation Management Division

Ministry of Irrigation &
Water Resources Management

"INMAS" PROGRAM

- IMD WAS SET UP IN 1984 TO IMPLEMENT THE PROGRAM ON

"INTEGRATED MANAGEMENT OF IRRIGATED AGRICULTURAL SETTLEMENTS"
(INMAS)

INMAS PROJECTS

7/25/01

IRRIGATION MANAGEMENT DIVISION

Purpose of "INMAS" Program

"To bring together all partners involved in production and marketing of produce that include farmers, government agencies, banks and private sector institutions"

Key Areas

Current

- INSTITUTIONAL DEVELOPMENT
- AGRICULTURAL PRODUCTION
- OPERATION & MAINTENANCE (Turnover)
- COMMERCIALIZATION
- MARKETING & CREDIT

Future

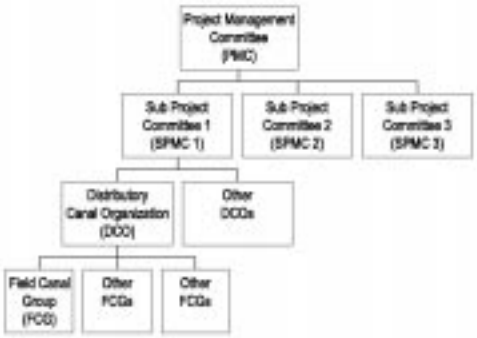
- Watershed Management
- Legal Procedure
- Water Related Health

7/25/01

Collaborating Agencies

- Department of Irrigation
- Department of Agriculture
- Department of Agrarian Services
- Land Commissioner's Department
- Financing Institutions
- National Aquaculture Development Authority
- Department of Animal Prod & Health
- Coconut Cultivation Board
- Cashew Corporation
- IWMI/Faculty of Agriculture/HARTI
- Agricultural Development Authority
- Provincial Councils

Project Management Organization



Pre & Post Participatory Management

Function	Pre-Participatory	Post-Participatory
Seasonal Planning	Agencies/ratified at Kanna meeting	PMC/ratified at a special PMC
Operation planning	Agencies/ratified at Kanna meeting	PMC/ratified at a special PMC
DC Operations	Irrigation Dept.	FO
FC Operations	Agrarian Services Dept./Welvidane	FO/FCG
Maintenance Priorities	Irrigation Dept.	PMC
Maintenance of DC	Irrigation Dept.	FO

7/25/01

Institutional Development

- SETTING UP OF
  - 710 Distributory Canal Organizations
  - 38 Project Management Committees
  - 30 System Level Farmer Organizations
  - 20 Sub Project Committees
  - 10 Farmer Companies

Agricultural Production Paddy

AREA UNDER INMAS	- 159,000 ha
TOTAL ASWEDDUMIZED	- 735,000 ha
PERCENTAGE	- 21.5 %
TOTAL IRRIGATED	- 560,000 ha
PERCENTAGE	- 28 %
% OF PADDY PRODUCTION from INMAS / NATIONAL (1999)	- 40 %

Turn Over of O&M

- Number of Schemes - 38
  - 1212
  - 1161
- Total Number of DCs Maintained by FOs - 1 System
- Irrigation Management Transfer (IMT)

DC-Distributory Canals

Major Issues

- Low productivity of land & water
- Low profitability in farming
- Deterioration of watersheds
- Intersectoral transfer of water without compensation/consultation
- Sectoral approach in water resources development
- Lack of quantitative water use assessment
- Poor data quality and delay in collection & processing

Data Collection

- Cropping extents/yield/Production
- Livestock/Fishery
- Institutional
- Credit & marketing
- Incomes of farmers
- Basins/watersheds

Problems in Data

- Inaccuracy
- Delay in transmission
- Delay in processing
- Poor exchange/sharing among stakeholders
- Improper data collection mechanisms
- Lack of focus
- Inadequate availability of information to interest groups

Coconut Cultivation

A Nursery in

Bathmedilla

Scheme

Neelabemma Scheme Banana Cultivation

Muthukandiya Fish Pond

Dambarawa

Muthukandiya

GAL OYA

(LEFT BANK)

SCHEME

Combined Harvester

Objectives

- SHORT-TERM
  - To increase agricultural productivity per unit of water
  - To increase agricultural productivity per unit of land
  - To distribute irrigation water adequately & equitably
  - To ensure timely supply of inputs & marketing of produce

7/25/01

Objectives (Contd....)

- To set up and develop farmer organizations to facilitate farmer participation
- To facilitate mobilization of resources for O&M by beneficiaries
- To support maintenance of irrigation systems at optimum level
- To help identify system rehabilitation needs through farmer participation

7/25/01

Long-Term

- To integrate small farmers to gain advantages of commercial holdings
- To promote crop diversification & rotation
- To promote social & economic development of the farming community
- To improve marketing of products & by products
- To promote processing of agricultural produce to semi finished or finished products
- To facilitate Irrigation Management Transfer (IMT)

7/25/01

Ceylon Electricity Board (CEB)

Lakshitha Weerasinghe, Electrical Engineer

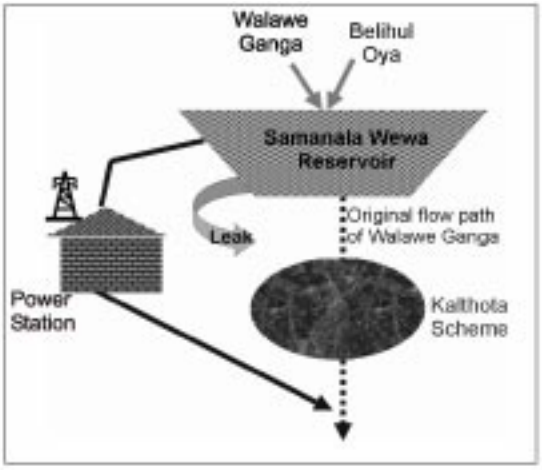
Energy saving has been done cross-comparing the value of Samanala Wewa waters for agricultural production and for power generation. For each kg of paddy not produced Rs. 10.70 will be lost to the nation while for each kilowatt hour of electricity not generated Rs. 2.41 is lost to the nation. If irrigation release is terminated and paddy imported, the CEB gains heavily, but there is a loss to the country and in particular to the rice farmers living in Kalthota many of whom have paddy cultivation as their sole source of income. Four alternatives were presented for managing the existing water resources more efficiently and equitably.

Energy Saving by cross comparing the worth of Samanala Wewa waters to Power Generation and Agriculture

Samanala Wewa Power Station

Ceylon Electricity Board

Sri Lanka



Sri Lanka's Agriculture sector

Paddy Production in 1999	= 2,868,000 MT
Rice imports (Paddy equivalent)	= 306,000 MT
Value of Rice imports (1999)	= 3,276 mill. Rs
Average import price per kg of paddy	= Rs. 10.70

Sri Lanka's Power Sector

% of Gross generation	- Hydro68.6% - Thermal 31.3%
Average fuel cost for thermal Power	= 2.41Rs/kWh
Cost of fuel imports for generation –1999	= 3.36 billion Rs.
Average Selling price	= 4.43 Rs/kWh

In a nutshell…

For each kg of paddy not produced…

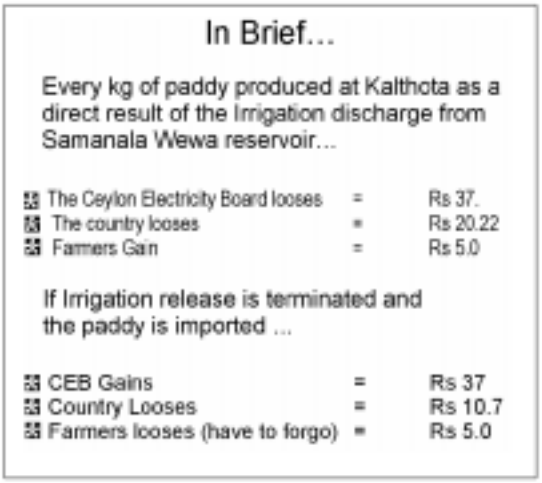
Rs. 10.70 will be lost to the nation !

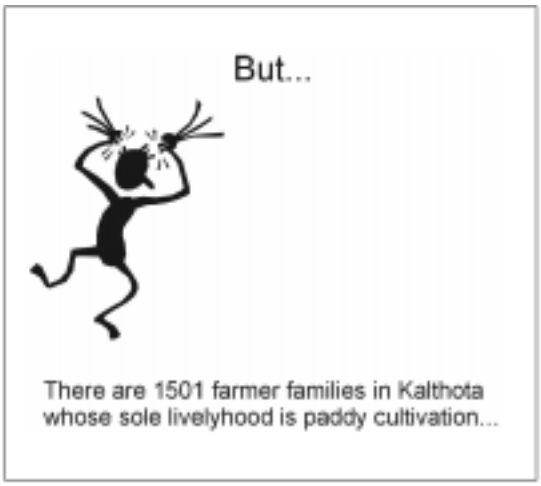
For each kWh of electricity not generated…

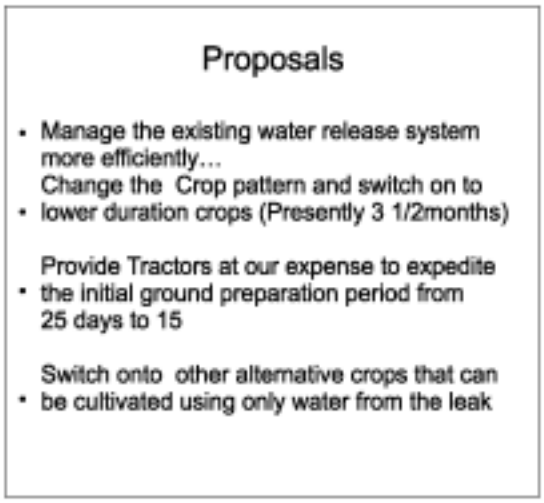
Rs. 2.41 will be lost to the country

Considering the harvest that is <u>directly as a result</u> of Irrigation discharge…

Cost of Production (Excluding water)	= Rs. 6.9
Selling Price	= Rs. 12.
Profit to farmers	= Rs. 3.9
Specific water consumption	= 10.86 m^3
No of Energy units lost for 1kg of paddy	= 8.36 kWh
Cost of fuel imports to produce 8.36 kWh	= Rs. 20.22
Import price of rice	= Rs. 10.70







National Aquaculture Development Authority (NAQDA)

A.M. Jayasekera, Director General

The NAQDA's main objectives are to: (a) increase the inland fishing production as a source of protein for rural communities, (b) generate income and employment opportunities, (c) increase foreign exchange earnings from the export of aquaculture products. In order to achieve the above objectives, they develop inland fisheries and aquaculture, coastal aquaculture, and sea farming. They collaborate with organizations such as Irrigation Management Division of the Ministry of Irrigation and Water Resources Management, the MASL, Agrarian Service Department and the NGO sector in aquaculture development. Development of aquaculture in the Ruhuna Basin is important in view of the vast resources available and the potential for increasing food security, for prevention of malnutrition, and for generation of income and employment through the production of freshwater fish and shrimps.

The Sri Lanka National Water Partnership (SLNWP)

Nanda Abeywickrema, Senior Asdvisor to the Director General, IWMI

The Sri Lanka National Water Partnership (SLNWP) could relate to the Ruhuna Benchmark Basin Program (RBBP). The Lanka Jalani on integrated water resources management was launched in May of this year with stakeholders from the government, private sector, NGOs, and media. The proposed RBBP should be integrated into the Global Water Partnership (GWP) South Asia Program. The Partnership includes all types of stakeholders, not only from the water sector, but industry, farmers groups, etc. As a part of the GWP, the SLNWP would not do research but could serve as a catalyst to help promote the RBBP research and extension activities. They would facilitate action and help to insure the best use of research results.

WORKING GROUP DISCUSSIONS

Participants were divided into four groups to discuss each of the four topics relating to the *benchmark basin program* listed below.

- What benefits would you hope to get?
- How can you contribute?
- What are the priority areas?
- How do we proceed from here?

The group discussions lasted for an hour and a half. At the end of this time a committee consisting of representatives from each of the four teams formulated the following summary of the key points.
.

SUMMARY OF GROUP DISCUSSIONS

1. What kinds of benefits would you hope to get?
   - 1.1 Information pool, sharp knowledge, access to accurate data
   - 1.2 Promote collaboration between different sectors
   - 1.3 An advanced database collection being used in addressing research and development issues
   - 1.4 Training and capacity building in research tools and analyses
   - 1.5 Through all these, we would like to achieve a rising awareness of all stakeholders in problems requiring collaboration for solution.

2. How can you contribute?
   - 2.1 We can contribute by making available field officers and offices for data collection
   - 2.2 Contribute by sharing
   - 2.3 Contribute to research and training jointly
   - 2.4 Financial support by certain agencies
   - 2.5 Active participation in the process
   - 2.6 Database management
   - 2.7 Provide information on policy and program changes
   - 2.8 Educate officers at implementation level

3. What are the priority areas?
   - 3.1 Build data sets
   - 3.2 Characterize the basin
   - 3.3 Developing performance indicators
   - 3.4 Deal with competing policy, institutional issues with allocations of water between sectors
   - 3.5 Catchment protection
   - 3.6 Capacity building in all the institutes that are involved

4. How to proceed?
   - 4.1 Establish a Steering Committee at the national basin level (the members of the committee to be the same as the steering committee for the WWAP program.
   - 4.2 Develop a concept note on terms of reference to be suggested by the steering committee.
   - 4.3 Establish one or more working groups and develop a clear work plan and program of activities
   - 4.4 Each agency to identify a link person
   - 4.5 Partner ministries and organizations to sign MOUs where appropriate, and IWMI would be the disburser of funds
   - 4.6 Examine both historical and present systems in order to see how they are being managed
   - 4.7 Inventorize and review all existing data
   - 4.8 Data should be centralized in one database that should be accessible to everyone
   - 4.9 Feedback on benchmark activities both at the grassroot level and at the highest level
   - 4.10 Concentrate on public awareness and social awareness at the local, regional, national, political and administrative levels

APPENDIX A

PARTICIPANTS

No	Name	Designation	Address
1.	Abeywickrema, Nanda	Senior Advisor to DG	IWMI Tel: 867404 E-m: n.abeywickrema@cgiar.org
2.	Amerasinghe, Felix	Principal Researcher	IWMI Tel: 867404 E-m: f.amerasinghe@cgiar.org
3.	Bambaradeniya, Dr. Channa	Head, Bio-Diversity Unit	IUCN, 53 Horton Place, Colombo 7 Tel: 694094 Fax: 682470
4.	Bandara, Palitha	C.I.E. (Planning)	Department of Irrigation 238 Bauddhaloka Mawatha, Colombo 7 Tel: 586326
5.	Bandusena, S.B.	Secretary	Ministry of Irrigation and Water Resources 500 T.B. Jayah Mawatha, Colombo 10 Tel: 688256
6.	Barker, Dr. Randolph	Principal Researcher	IWMI Tel: 867404 E-m: r.barker@cgiar.org
7.	Batagoda, Milton	Team Leader	CARE International Dry Zone Agriculture Dev. Project 90 New Road, Hambantota Tel/Fax: 047-22028
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APPENDIX B

ON-GOING RESEARCH ACTIVITIES IN BENCHMARK BASIN

1. Benchmarking Irrigation System Performance

Theme: Integrated Water Management for Agriculture (IWMA)

Start Year	:	2000
Expected Completion Year	:	On-going
Project Leader(s)	:	David Molden, Hammond Murray-Rust
Funding Agency or Core Budget	:	IPTRID
Collaborating Agency(ies)	:	Sri Lanka ID, IPTRID, WB, ICID
Project Location	:	Multinational – SL case studies with ID

Project Objective/Hypothesis:

In a move to address constraints within the irrigation and drainage sector the World Bank has initiated the Institutional Reform in Irrigation and Drainage program. This program has three main components: performance indicators and benchmarking; public and private partnerships; and regulatory framework.

As part of the performance indicators and benchmarking component the World Bank has requested assistance from IPTRID to initiate a joint study to:

- identify simple, but effective and universally applicable performance indicators for benchmarking;
- formulate and field test a benchmarking methodology for the irrigation and drainage sector.

IWMI is developing the database and analysis software and has been asked to facilitate the SL Case studies in collaboration with the ID.

2. Impact of Water Saving Irrigation Techniques in Rice in Uda Walawe

Theme: Integrated Water Resource Management for Agriculture (IWMA)

Start Year	:	2001
Expected Completion Year	:	2002
Project Leader	:	Ronald Loeve
Funding Agency or Core Budget	:	Core Budget
Collaborating Agency	:	The Mahaweli Authority of Sri Lanka
Project Location	:	Uda Walawe

Project Objective:

One of the major objectives IWMI is involved in is to identify irrigation system and basin-wide implications of on-farm Water Saving Irrigation (WSI) innovations in order to understand the degree to which their large-scale adoption will lead to system-wide and basin-wide water savings and water productivity increases. The effects of WSI on health and environmental issues are of major importance and have to be addressed.

Hypothesis:

Large-scale adoption of WSI results in real water saving at system level and the amount of water saved can be directed to other beneficial uses (environment, cities, more agriculture) leading to increases in water productivity. The degree to which large-scale adoption of WSI will lead to system-wide and basin-wide water savings and water productivity increases depends on the fate of the outflow.

Within these objectives and the IWMI benchmark basin exercise, this initial study tries to gain insight in the actual on-farm water management practice in Uda Walawe. Knowing the actual on-farm water management is a prerequisite for identifying the scope of possible on-farm water savings, improving the water management and introducing new WSI techniques like Alternative Wet and Dry Irrigation (AWDI).

Furthermore there is a research interest to look at the impact of AWDI on vector breeding and rice yield. In Uda Walawe AWDI, as such, is not practiced, but the water rotation (3 days on, 4 days off schedule) practiced more or less resembles AWDI. Farmers recorded fields falling dry after 1-2 days.

3. Sri Lanka/Eco – Water Savings

Theme: Integrated Water Resource Management for Agriculture (IWMA)

Start Year	:	2000
Expected Completion Year	:	2002
Project Leader	:	R. Sakthivadivel
Funding Agency or Core Budget	:	Core
Collaborating Agency(ies)	:	The Mahaweli Authority of Sri Lanka, Irrigation Department, etc.
Project Location	:	Benchmark basin Sri Lanka

Project Objective/Hypothesis:

This project will support a group of activities within the benchmark basin including water accounting, testing of water saving practices, modeling, and monitoring and predicting the impact of various irrigation activities on ecological reserves. With water accounting, various flow paths will be traced, leading to ways to save water and thereby increase the productivity of water. Modeling will be used to obtain present water accounts and to predict the impact of interventions.

Particular attention, in line with the comprehensive assessment, will be given to better understanding the relation between irrigation and important ecological reserves.

4. Water Accounting and Identifying Flow Paths to Wetlands and Sinks in Walawe Basin

Theme: Integrated Water Resources Management/ Benchmark Basins

Start Year	:	2000
Completion Year	:	2001
Project Leader(s)	:	R. Sakthivadivel/ Prof. Nandalal
Funding	:	Core Budget
Collaborating Agencies	:	University of Peradeniya and Mahaweli Economic Agency
Project Location	:	Uda Walawe, Embilipitiya

Project Objective/Hypothesis:

- To trace the flow paths of drainage cum return flow emanating from the command area of Walawe Irrigation system and how they interact with various downstream lagoons and eventually get into the sea.
- How much water (Flow hydrograph) enters into these lagoons and ultimately into the sea in a normal, dry, and wet year.
- What is the optimal way of operating the two reservoirs (Samanalawewa and Walawe) so that out flow to sea can be minimized?
- What is the likely impact of extending the LB canal to its design level on the inflow to the lagoons?

5. Impact Assessment of Infrastructure Development on Poverty Alleviation: Case Studies on Irrigation Project

Theme: Water Resources Institutions and Policies (WRIP)

Start Year	:	May 2001
Expected Completion Year	:	February 2002
Project Leader	:	Intizar Hussain
Funding Agency or Core Budget	:	JBIC
Collaborating Agency(ies)	:	IWMI and JBIC
Project Locations	:	Uda Walawe Left Bank in Sri Lanka and Rechna Doab in Pakistan

Project Objectives/Hypothesis:

The main objective of this study is to undertake an assessment of the economic impact of infrastructure development on poverty. This study takes irrigation projects as a case study on the impact assessment. The study aims to fill a major gap in the literature on the role of irrigation in poverty reduction, particularly its impact on transient poverty. This study formally investigates the dynamic poverty reduction effect of irrigation infrastructure development by integrating field observations, economic theory, and econometric analysis. In addition, this study also focuses on

the impact of other infrastructures' development, such as availability of electricity, accessibility of paved road, etc. By using the quantitative evaluation results, the study also derives policy implications for future infrastructure development in a rigorous manner.

6. Malaria Risk Mapping

Theme: Water, Health and Environment (WHE)

Start Year	:	1999
Expected Completion Year	:	2002
Project Leader	:	Wim van der Hoek
Funding Agency or Core Budget	:	Japan program support
Collaborating Agency(ies)	:	Anti-Malaria Campaign
Project Location	:	Ruhuna, later to be extended to the entire island

Project Objective/Hypothesis:

- To identify environmental determinants of malaria
- To provide a malaria risk map that will:
  - make it possible to target priority areas with control activities
  - serve as a decision support tool in health impact assessments for future water resources development projects
- To develop an early warning system for impending epidemics based on the malaria risk map.

7. Agro-ecosystem Approach to Human Health

Theme: Water, Health and Environment (WHE)

Start Year	:	1999
Expected Completion Year	:	2002
Project Leader	:	Wim van der Hoek
Funding Agency or Core Budget	:	IDRC + core
Collaborating Agency(ies)	:	Mahaweli Authority; Anti-Malaria Campaign; McGill University Brace Center for Water Resources Management; University of East Anglia
Project Location	:	Walawe

Project Objective/Hypothesis:

- Increase the productivity of water in the Uda Walawe basin while reducing human health risks and protecting the environment.
- Develop a methodology for an integrated approach to agricultural water management in river basins, taking into account human health and environmental considerations.
- Evaluate the impact of different water management regimes on: a) vector breeding, b) availability of water for domestic purposes.

- Estimate the requirements for agrochemical inputs under different water management regimes and cropping patterns.

8. Pre-development Biodiversity Assessment of the Uda Walawe Irrigation Project Extension Area

Theme: Water, Health and Environment (WHE)

Start Year	:	2001
Expected Completion Year	:	2001
Project Leader	:	Felix Amerasinghe
Funding Agency or Core Budget	:	Core
Collaborating Agency(ies)	:	IUCN Sri Lanka
Project Location	:	Walawe

Project Objective/Hypothesis:

The Uda Walawe Irrigation Extension Development Project provides a rare opportunity to make a longitudinal assessment of the impact of agricultural development on biodiversity. This area is scheduled for irrigation development during 2001-2002. In 2001 a pre-development biodiversity assessment field survey will be done in this area. *The objective is to establish a data baseline that can be used to evaluate changes that occur during the process of development, and in the settled irrigation phase thereafter.* Both flora and fauna will be inventorized during the study. Basic water quality parameters of the aquatic resources of the area will be assessed. Groundwater levels and quality also will be measured. In 2001 the initial phase of the study will be implemented but a proposal is available to seek donor funding to maintain monitoring of biodiversity changes through the infrastructure development, settlement, and irrigated agriculture phases.

9. RS based Hydrological Model for the Walawe Basin

Theme: Integrated Water Resources Management/Benckmark basins

Start Year	:	2001
Expected completion year	:	2002
Project Leader(s)	:	Ian Makin, Dilkushi de Alwis
Funding Agency or Core Budget	:	Core Budget
Collaborating Agency(ies)		
Project Location	:	Walawe basin

Project Objective/Hypothesis:

To simulate the hydrological cycle from precipitation to runoff including the effects of resources, regulators, water extractions, water demands, groundwater aquifer storages etc., the project will be done in two stages. First, a hydrological model will be used to simulate the vertical water balance at daily time steps for each land cover within each sub-basin derived from a digital elevation map. The model would approximate the physical processes controlling the transformation of precipitation into evapotranspiration, runoff and infiltration separately for each land covers within each sub-basin.

Then at the second stage a lower resolution water allocation model will be used to study the effects of reservoirs, regulators, water restrictions, demands, allocations and different water extraction methods and priorities in the form of different scenarios.

10. Mediation of Conflicts in the Water Sector

Start Year	:	October 2001
Expected Completion Year	:	End 2001
Project Leader(s)	:	Ian Makin, S M S B Niyangoda, Franz Helm
Funding Agency or Core Budget	:	DSE
Collaborating Agency(ies)	:	MASL, CEB, ID, NWSDB, Department of Wildlife Conservation
Project Location	:	Benchmark basin

Project Objective/Hypothesis:

The overall aim of the project will be to investigate and classify types and sources of water conflict, at all levels, and to formulate recommendations for institutions to reduce the potential for conflicts. These issues will be investigated in a workshop of about one week duration. In order to ensure that the discussions are rooted in real-life situations, the workshop will be held in Ruhuna benchmark basin where conflicts exist and where the pressures of new demands, due to recent rapid economic development and urban growth, are known to be strong.

Specific objectives are:

- to analyse the roots of disputes among various users of a water-stressed basin;
- to identify existing avenues of communication among users, considering the time periods involved, the institutions engaged, and the water resources to be shared;
- to identify existing institutions and tribunals for moderation of disputes;
- to find improved avenues for gathering and sharing information to support an equitable system of access and use;
- to establish principles of co-operation towards sharing the available resource;
- to elaborate ideas about the institutions needed to sustain such sharing principles and to reduce the likelihood of conflicts.

APPENDIX C

WORLD WATER ASSESSMENT PROGRAM: REVISED PROPOSAL FOR SRI LANKA CASE STUDY

World Water Assessment Program

The World Water Assessment Program (WWAP) is a United Nations system-wide effort to develop the tools and skills needed to better understand the basic processes, management practices and policies that will help improve the supply and quality of global fresh water resources. The Program was initiated in response to the need to monitor the success of plans and strategies developed for the use of the natural resources to serve the society, while ensuring their sustainable use. It is an integrated comprehensive freshwater assessment process, for which 23 agencies or members of United Nations have pooled their resources and concerns. The WWAP Secretariat, which coordinates the WWAP activities, is located in UNESCO Headquarters.

The mandate of WWAP includes the following:

a. Development of new methodologies, monitoring techniques and modeling tools for an comprehensive assessment of resources.
b. Compilation and interpretation of data and establishment of a geo-referenced meta-data-base.
c. Preparing a series of World Water Development Reports as a “living document” to track and report on progress in devising new assessment tools and policies.
d. Improving the capacity of the countries in water assessment with an emphasis on poor and developing countries.
e. Establishment of a worldwide information network among governments and institutions concerned with water issues.

An important output of the WWAP is the World Water Development Report (WWDR) which would be continuously updated to provide an authoritative picture of the state of global freshwater resources and water stewardship. The first WWDR, scheduled to be presented to the Third World Water Forum in 2003, would essentially be based on several case studies. Therefore, the first WWDR would:

- Focus on case studies to demonstrate the analytical approach.
- Report on initial suite of key water sustainability indicators.
- Begin work to integrate water-related and socioeconomic indices.

It will concentrate on an inaugural assessment of progress since the Rio Summit (1992) and on developing appropriate assessment methodologies.

There are three linked components of WWDR end they are as follows:

- Assessment of human water stewardship.
- Assessment of the state of global water system.
- Assessment of the critical problems.

These components would link with the seven challenges/target areas identified at Second WWF through indicators. The seven challenges are as follows:

1. Meeting basic needs.
2. Securing food supply.
3. Protecting ecosystems.
4. Sharing water resources.
5. Managing risks.
6. Valuing water.
7. Governing water wisely.

WWAP Synthesis meeting held in April 2001 agreed that Water for Energy, Water for Industry and Ensuring Knowledge Base are also to be included as challenge areas.

Sri Lanka Case Study: Ruhuna Basin

Considering the importance of having an regional development perspective, Ruhuna Basins were selected for the Sri Lanka Case Study. It was also noted that IWMI has selected the same basins for their Benchmark Study, and the importance of converging the efforts of IWMI and other research efforts with those of the Ministry of Irrigation and Water Resources Management. Initially, Walawe, Menik and Kirindi Oya Basins were considered. To make it a continuous unit, it was later decided to include Malala Oya and other small streams between Walawe and Menik rivers in the case study area.

Objectives of Sri Lanka Case Study

The main objective is the assessment of present status, critical issues and water resources development potential of the river basins with a regional development perspective, taking in to consideration the future socio-economic scenario.

The data collection and analysis would contribute to achieve the objectives of the First WWDR. It would provide for testing of indicators and methodologies developed for WWAP.

Implementation of the Study

Ministry of Irrigation and Water Resources Management would implement the study.
International Water Management Institute would be a facilitating agency. UN agencies based in Sri Lanka, that promote WWAP, would also facilitate the study.

M/I and WRM would collaborate with relevant State Agencies and obtain input from similar programs in the Case Study Area. The relevant agencies would be the collaborating partners. Coordination and guiding at the national level would be achieved through a Study Advisory Committee (SAC) comprising representatives of relevant agencies and a group of observers from collaborating partners. A Study Team selected from the core agencies would implement the study, and would report to the SAC.

Components of the study would be assigned to consultants and State Agencies.

Scope and Methodology

The study would concentrate on the Ruhuna Basins, bounded by Walawe Ganga and Menik Ganga. However, the study should take into account the social, economic and political dynamics that are not constrained by hydrological boundaries. Therefore, in issues such as rural-urban migration, southern area as a region would be considered. In dealing with issues such as food security, energy supply and research and development, national level interactions need to be considered.

The study would also look into the future and would develop scenarios for short-term (2005), mid-term (2015) and long-term (2030). These could be based on the scenarios developed for the World Water Vision exercise, and could make use of national level scenarios already developed. Changes during the study period and the projections based on various development scenarios will be analyzed. Special assignments would be undertaken to examine the impacts of such developments. Socio-economic assessments will be made and two study assignments relating to sociology and resource economics would be carried out.

The study would review the data collected and analyses carried out earlier. Examples are the studies conducted by WRS and IWMI. It should also review the Deduru Oya Study by IMD and other similar studies and use the relevant indicators. Therefore, the first step would be preparation of a Water Resources Information System (WRIS). The purpose of this would be to:

- Identify existing sources of national water information available at a global scale that is in the public domain across the ten challenge areas.
- Assess the availability, extent, archival system and updating process.
- Modality to gain access to the different individual sets of information.
- Propose a single, unified dataset, adopting due quality assurance during data transfers.
- Develop a structure of the database in line with the ten challenge areas adopted by WWAP, assigning them across the ten challenge areas.

WRIS would also include a list of recently completed studies and on-going studies.

The study would also link with other studies carried out in the basin. Benchmark Basin study by IWMI is of particular importance. Water Resources Board (WRB) is planning to conduct a groundwater study in Hambantota and Moneragala Districts. WHO has expressed willingness to help in studies related to health, and the Irrigation Management Division (IMD) is expected to take the initiative.

The study would comprise of two phases; (a) base-line data collection (including preparation of a database), indicator development and analysis (b) monitoring

The data collection would cover the following areas:

1 Social and Economic Survey

a) Demographics: including present population, rate of increase, rural/urban population, rural-urban migration, education levels, age groups, nutritional status, future trends. Analysis of about 30 years data is suggested.
b) Institutions: Institutions and their capacity for IWRM, weaknesses, beneficiary organizations and their role in decision-making and management by sector, adoption of technologies, financing, beneficiary participation in management, education and research and development.
c) Governance: Administrative Divisions and area, legislation, administrative procedures by local institutions with regard to water, local customs, special attention on issues such as pollution control and watershed management.
d) Economics: Production (agriculture/industrial), employment by sector, poverty, contribution to GDP, financing of water services.
e) Policy: National policy, specific Provincial policies and strategies on water, gender issues and issues specific to under-privileged sections of the society.

2. Assessment of natural resources and their use in river basins

(a) Rainfall, stream flow, rainfall/runoff relationship, trends of those parameters, time distribution, spatial distribution, low flow characteristics
(b) Flows to the sea
(c) Groundwater availability, safe extraction, recharge, quality
(d) Floods and droughts, frequency
(e) Infrastructure and not-structural measures for water resources management
(f) Water quality in river flow and return flow, trends
(g) Gross and net water use: agriculture, domestic (rural/urban), industries, wild life including predicted future use
(h) Planned trans-basin diversions
(i) Environmental needs of water
(j) Evaporation, evapotranspiration
(k) Land use
(l) Soil types
(m) Land degradation
(n) Biodiversity

3. Studies on water stress at specific locations and situations

Issues to be covered: sharing of water, pollution of water at specific locations (point-source), gender issues, water-related health issues, environmental problems, coastal issues.

Examples: Kaltota/Samanala Wewa, sharing of water between power and agriculture,
Effect of salinity intrusion on domestic water supply at Ambalantota, water logging and salinity issues in Kirindi Oya. Bio diversity in the national wild life parks in the basin.

Outputs

The outputs would be analyzed under different scenarios developed according to the following matrix:

Socioeconomic-political scenario		BAU	TEC	VAL
Development Scenario	Agriculture emphasis			
	Industrial emphasis			
	Integrated rural development			

(*Note:* BAU, TEC and VAL scenarios are based on World Water Vision Exercise as described below)

Under Business as Usual (BAU) scenario, it is assumed that there are no appreciable changes in policies on agriculture, investment and environment. Additional development of water resources would be negligible.

Under Technology, Economics and Private Sector (TEC) scenario, the private sector will dominate research and development of water resources. The public sector will play a low-key role and water resources and agricultural development will be guided by the economic value of returns.

Under Values and Life Styles (VAL) scenario, the Government would facilitate the private sector to implement strategies and technologies developed by public sector institutions, taking an increasingly regulatory role. Beneficiaries would play a significant role in the management of water resources. The Government will re-define national goals and objectives with respect to agriculture, environment, and investment, and would solicit international support in the form of investment in strategically defined water resources development objectives.

The short-term scenarios will be developed with the currently planned development programs including proposed Ruhunapura Project, and policy initiatives.

Human Water Stewardship

- Water policies, legislation, institutional arrangements for water resources management and crisis management, infrastructure, present capacity and capacity building requirements.
- Adequacy and future directions.
- Dynamics of the human well-being: Population, rural economies, sanitation, health and nutrition under different scenarios.

Natural resources

- Use by sector (agriculture, domestic, industrial, environmental)
- Water availability, water quality and water scarcity indicators, and sustainability
- Effects of trans-basin diversions
- Land use and sustainability
- Conservation and management

Critical problems

- Urgent issues to be addressed, and their dimensions under different scenarios

Monitoring Plan

The study should be monitored at the national level and the regional level. At the national level, the study would be monitored by a Committee comprising representatives of the relevant agencies. To avoid duplication, the monitoring and coordinating mechanism to be adopted by IWMI, on the Benchmark Basins Study would be made use of for this study as well.

Even after the Benchmark Study and base line data collection is completed, it is necessary to monitor the indicators. A team of a Resources Economist and a Sociologist would be assigned to assess the indicators at suitable time intervals. Monitoring would be supervised by the Committee.

Time Frame

Item	Task	Start	Finish
Phase 1. Step1: Data Collection			
1	Coordinating Mechanism established	June 2001	
2	Water Resources Information System	30 June 2001	31 July 2001
3	Assignments for data collection (gaps)	End of July 2001	September 2001
4	Preparation of database	September 2001	November 2001
Phase 1. Step 2: Data Analysis			
1	Developing indicators/indices	September 2001	November 2001
2	Building scenarios	September 2001	December 2002
3	Data analysis	October 2001	January 2002
4	First draft report (case study)	January 2002	February 2002
Phase 2. Monitoring Indicators			
1	Monitoring assignments awarded	September 2001	

It is noted that responsibility for developing indicators for WWAP has been already assigned to experts. However, if there are any specific issues relevant to the case study area that need additional coverage, more indicators would be developed.

Cost

A provisional cost estimate is annexed. This does not cover long-term capacity building requirements etc.

Draft Logical Framework

Narrative Summary	Objectively verifiable indicators	Means of verification	Risks and assumptions
Goal: Sustainable water resources use and management for the well-being of the population			
Purpose			
Assessment of water resources, development potential and challenges and capacity in Ruhuna Basins considering future social, economic, political and rural development scenarios	A set of indicators to asses water resources, development potential, challenges and capacity of the river basin	Report on Sri Lanka case study for WWAP	Resources are made available. Active collaboration from stakeholders Accurate data are available
Outputs			
A comprehensive database on water resources	Database established and maintained	Completed database Periodic reports	Stakeholders contribute to maintenance of database
Challenges for sustainable water use and critical areas identified	Listing of challenges and critical areas	Case study Report	
Policy, legislation and implementation gaps identified	Listing of policy legislation and implementation gaps	Case study report	
Mechanism (including a set of indicators) established to monitor progress in 7+ challenge areas	Assignments awarded, monitoring and reporting mechanism and links with database established	Periodic review of progress	Resources available to implement the monitoring. Commitment of stakeholders to WWAP objectives maintained

APPENDIX D

UNESCO'S HELP INITIATIVE

Peter Droogers, IWMI

Introduction

HELP (Hydrology for Environment, Life and Policy) is a new initiative to establish a global network of catchments to improve the links between hydrology and the needs of society. The vital importance of water in sustaining human and environmental health has been widely recognised by numerous national and international fora. However, no international hydrological program has addressed key water resources management issues in the field and integrated them with policy and management needs. HELP will change this by creating a new approach to integrated catchment management. HELP is a problem-driven and demand-responsive initiative, which addresses five key issues:

- Water and climate
- Water and food
- Water quality and human health
- Water and the environment
- Water and conflict

HELP was approved by the 28th Session of the IHP Bureau, which recommended that HELP should become a distinctive cross-cutting programme of the UNESCO IHP. The Bureau also recommended that HELP should develop strong links with appropriate parts of other global programs such as the WMO/WCRP, ICSU/IGBP, other UN agencies, non-governmental organizations, international programs and the World Water Council's Vision on Water, Life and Environment in the 21st Century.

HELP is founded on a global network of catchments. National or local authorities can suggest catchments for inclusion. Catchments will need to fulfil the HELP criteria for baseline physical and socio-economic data exchange and provide adequate local capacity to further the program. The benefits of inclusion are access to new data acquisition and analysis methods, sharing of expertise, access to data and findings from the other HELP catchments, and opportunities for funding and building capacity in water institutions.

Water managers and stakeholders can help to define the practical results that HELP is working towards. They are aware of the local problems and hence they have a vital role in formulating the agenda of HELP. Being at the interface between science, law and policy they can provide a vital link between science and society.

By appreciating the science better, **policymakers** can help to provide scientists with questions relevant to legal and policy issues. Addressing the issues of legal entitlement, they can assist in ensuring peaceful, long-term, equitable access to adequate water for current and future users in a flexible, predictable and enforceable framework. They have a vital role in devising an effective

legal and policy regime for equitable and sustainable use of water resources. This will identify the scope of the resource, alternative schemes for balancing every user's interests and ways of verifying compliance, so as to allocate the use of the resource fairly among all the stakeholders.

Water scientists need to communicate their research results to appropriate water resources managers. Their science should be delivered through innovative experimental field designs linking water-related physical and non-physical observations. Moreover, it should comprehensively address the effects of scale, recognizing that these may differ for the physical and non-physical issues. Their main role is to provide improved understanding of hydrological processes controlling both water quality and quantity, their relationship to ecology and how these affect or are affected by social, economic and legal structures.

Ruhuna benchmark basin in the HELP context

A proposal to get the Uda Walawe accepted as an evolving HELP basin has been approved during the HELP Task-Force meeting in March 2001. The following comments on the proposal were given:
"This is a good proposal to address the issue of food-conflict-nature. It appears that good support commitment is in place and the proposed activities well thought out although detail is somewhat lacking. Stakeholder involvement issues should be an interesting development in the light of the progressive Sri Lankan water law being introduced. The group expects this proposal to be become a classic model HELP basin for Asia."

APPENDIX E

DIALOGUE ON CLIMATE VARIABILITY, CLIMATE CHANGE AND WATER RESOURCES MANAGEMENT

Peter Droogers, IWMI

Introduction

According to the most recent report of the Intergovernmental Panel on Climate Change (IPCC), humanity's influence on the global climate is overwhelming and alarming. Most of the warming over the past 50 years is attributable to human activities. The IPCC predicts that as a result of the current level of greenhouse gas emissions the Earth's climate would warm at a rate unprecedented in the last 10,000 years, leading to widespread changes in global climate patterns and distribution of water resources. Decision making on water resources has yet to fully integrate these trends into policy, planning and management. In some cases, information on climate change scenarios applicable on national or regional level is not readily accessible. In others, the tools and technical knowledge to make the best use of this information is not present, especially at the regional level.

The purpose of the **Dialogue on Climate Variability, Climate Change, and Water Resource Management** is to exchange views on the implications of climate change for water resources management and policy development and to identify a way forward. This new initiative was initiated by the Dutch government in close collaboration with the 3rd World Water Forum Secretariat. A workshop was organized by the 3rd World Water Forum Secretariat and the United Nations University, Tokyo, June 2001, to set up this dialogue.

It was clear that the Dutch government was willing to invest in a secretariat, based in Holland. Most importantly the dialogue should be based on participation with other existing basin initiatives, such as World Water Assessment Program, HELP (Hydrology for Environment, Life and Policy), Millennium Ecosystem Assessment.

Ruhuna benchmark basin in the dialogue on climate change context

The Ruhuna benchmark basin will be proposed as one of the basins where the Dialogue process will be tested and implemented. As the Dialogue is in its inception phase, no clear guidelines or procedures are in place, but Ruhuna will comprise all the required components to be one of the main study areas.

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FUTURE HARVEST

IWMI is a Future Harvest Center supported by the CGIAR