"Expansion without Extinction" Walawe River Basin Sri Lanka

Harmonizing Environmental Considerations with Sustainable Development Potential of River Basins – UNESCO HELP Symposium

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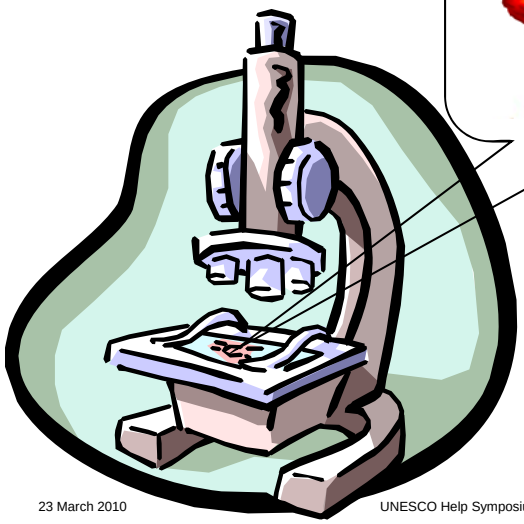
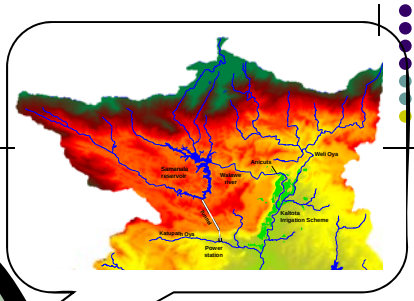
Background

- **"Walawe"** is a HELP 'operational' Basin, proposed by the International Water Management Institute (IWMI)
- IWMI operated this basin as one of its 'Benchmark Basins'
- EXPANSION WITHOUT EXTINCTION: Biodiversity and Livelihoods in the Walawe Left Bank Irrigation Upgrading and Extension Project
- Material presented here to a very large part is acknowledged to IWMI
- Partners: **MASL IWMI IUCN Nippon Koei Royal Netherlands Embassy Sri Lanka**

IWMI Benchmark Basins





Scrutinizing River Basins:

A Field Laboratory

Benchmark Basin Concept

Monitoring & Evaluation

Impacts

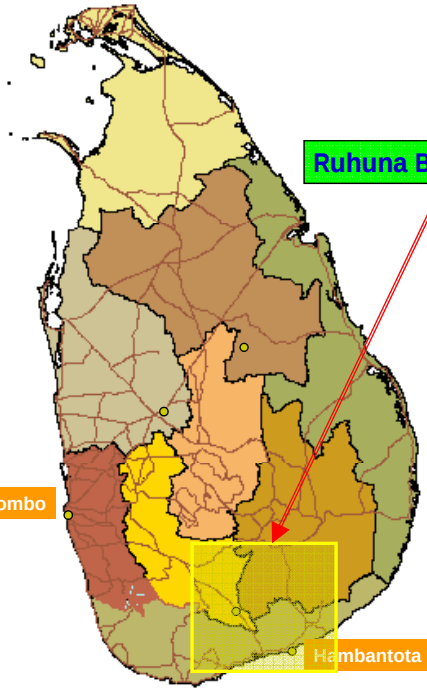
Strengthening IWMI Global Research	Research - National Basin Priorities	Development Interventions Options	Capacity Building
▪ Mapping ▪ Integration ▪ Tools and Methodologies	▪ Long term ▪ Continuity ▪ Synergy		

IWMI Research Framework and Themes

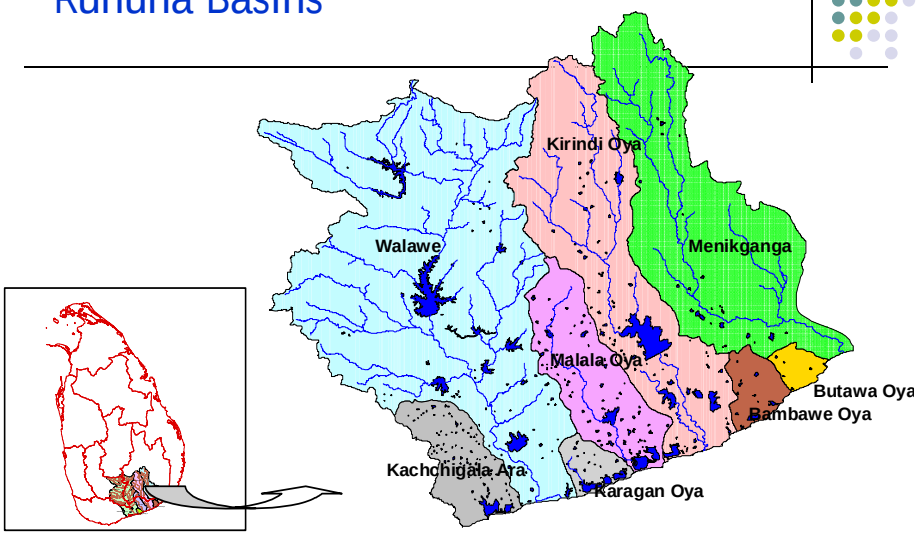
Partnerships, Small Scale Research, Database development

i.e. knowledge base on basin

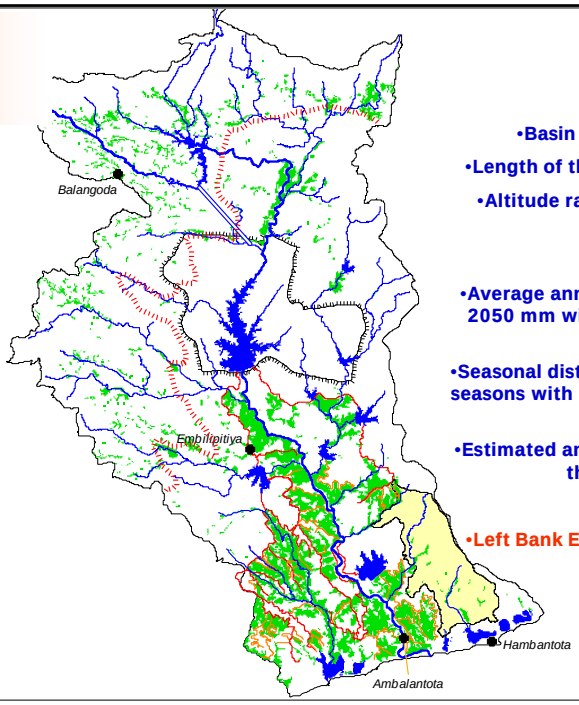
Walawe Basin



Ruhuna Basins

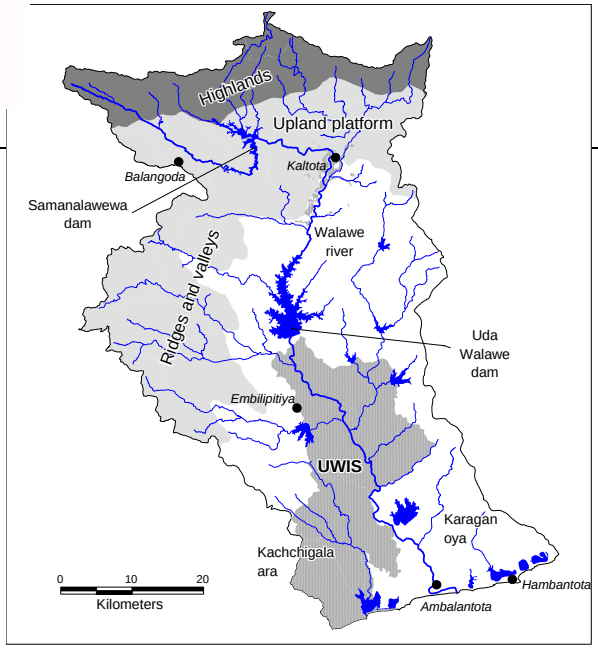


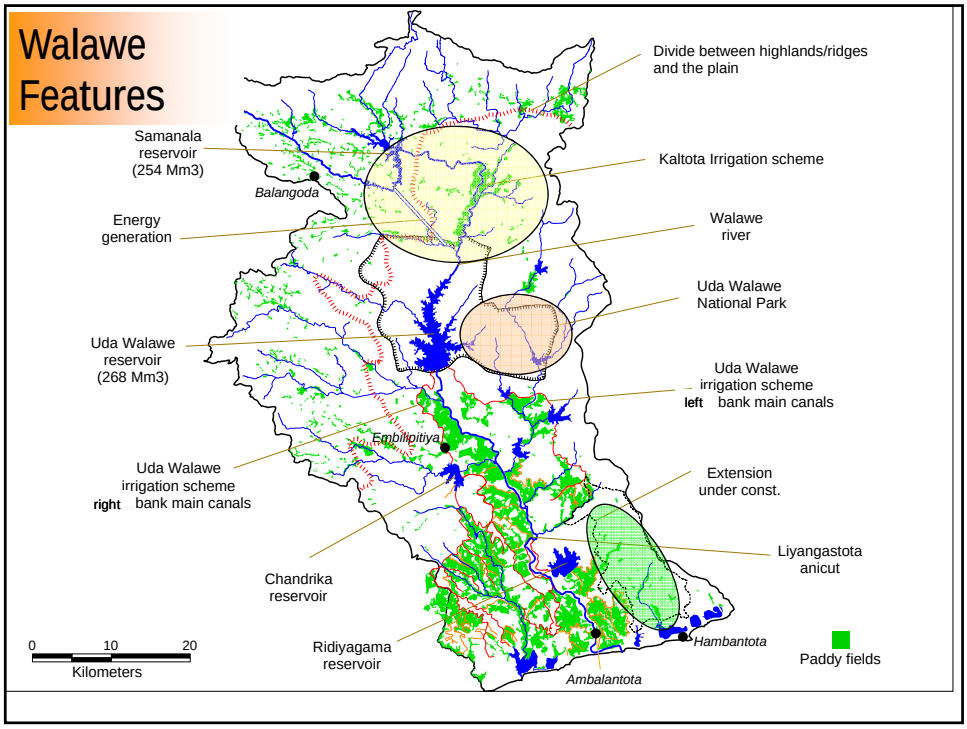
Walawe Features



- **Basin Area: 2,442 Km2**
- **Length of the river: 84.9 Km**
- **Altitude range: sea level to 2395 m**
- **Average annual precipitation: 2050 mm with uneven spatial distribution**
- **Seasonal distribution: two wet seasons with peaks in April and November**
- **Estimated annual river flow at the outlet: 34 Mm3**
- **Left Bank Expansion 5152 ha**

Walawe Features





Uda Walawe Dam

Upstream Panoramic From the Uda Walawe Dam

Ancient Sluice

The Banana Bonanza

Small Tanks

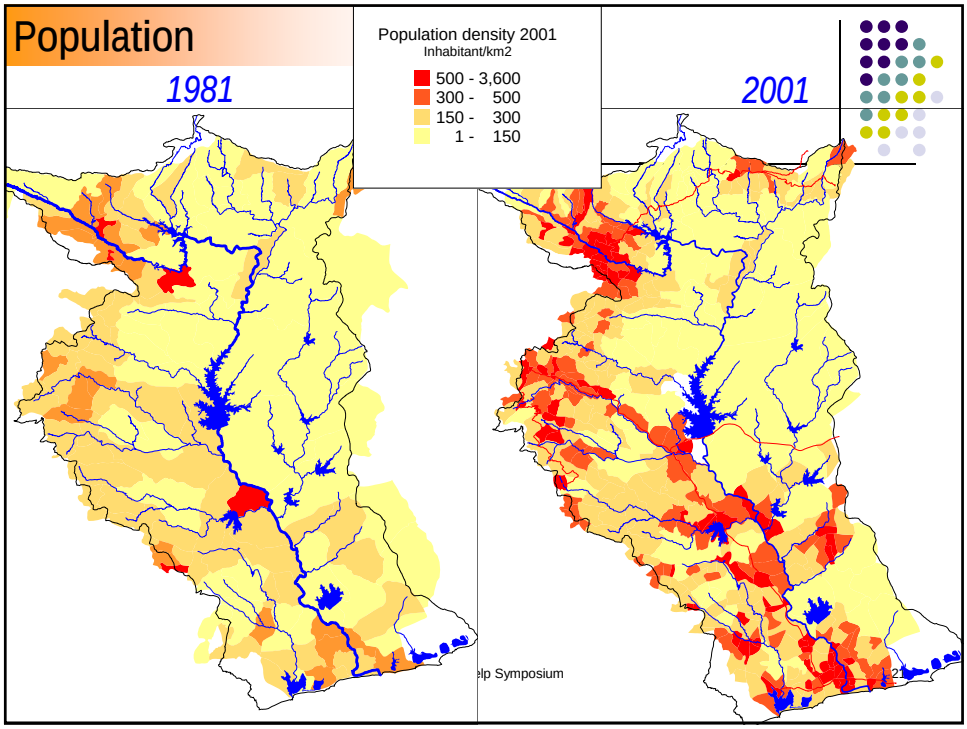
Demography

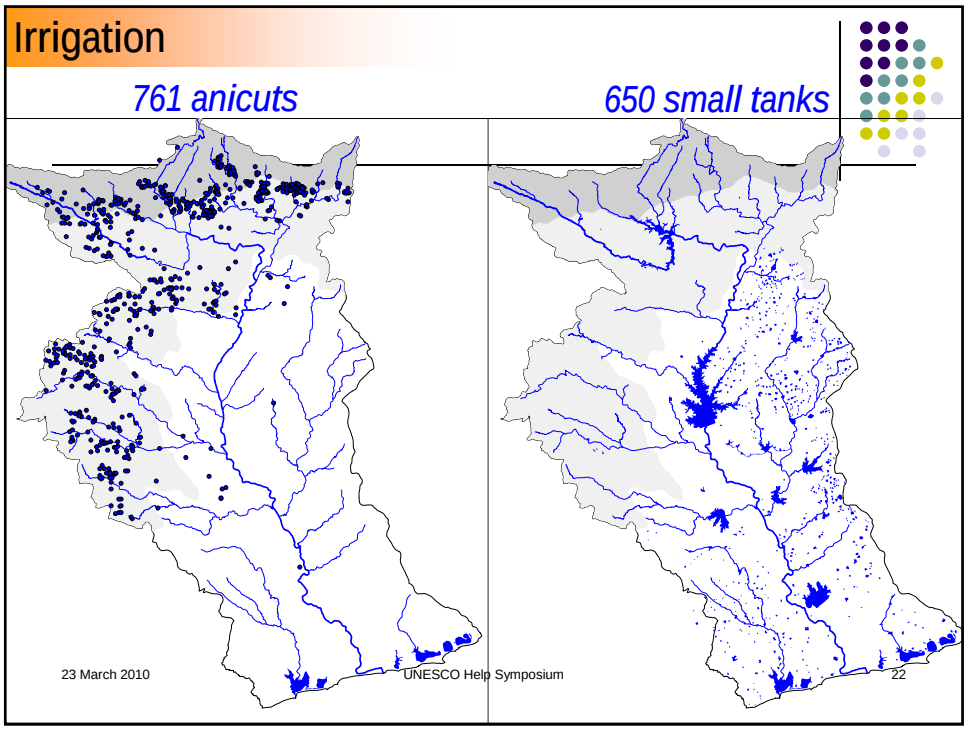
Total population in the basin:	574,000

Livelihoods:

- Agriculture and Livestock - 90%
  of the population of which

- Irrigated paddy cultivation - 40%
- Slash & burn cultivation - 30%
- Home garden cultivation - 20%
- Other - 10%


Population
1981
Population density 2001
Inhabitant/km2
500 - 3,600
300 - 500
150 - 300
1 - 150
2001
lp Symposium


Irrigation
761 anicuts
650 small tanks
23 March 2010
UNESCO Help Symposium
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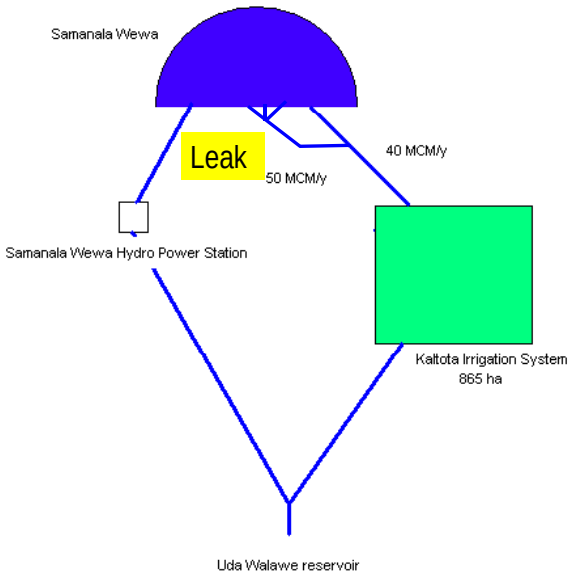
Power-Irrigation conflict

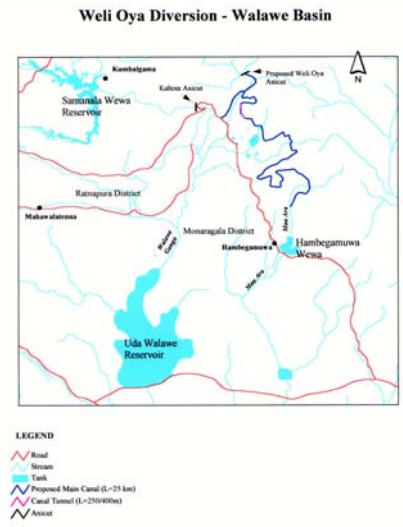
40 Mm3= Rs. 210 million/year lost for CEB while
the agricultural revenue from this water diverted is around Rs. 62 million/year.

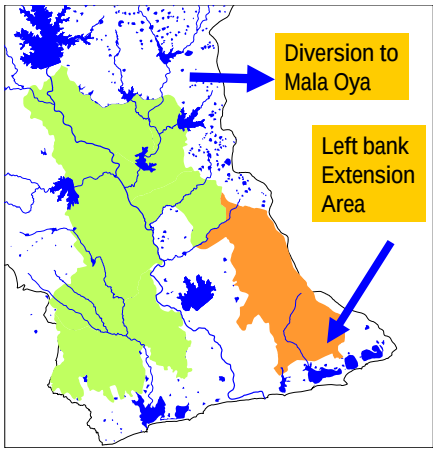
How to force farmers in Kaltota to reduce water consumption?



23 March 2010

New developments





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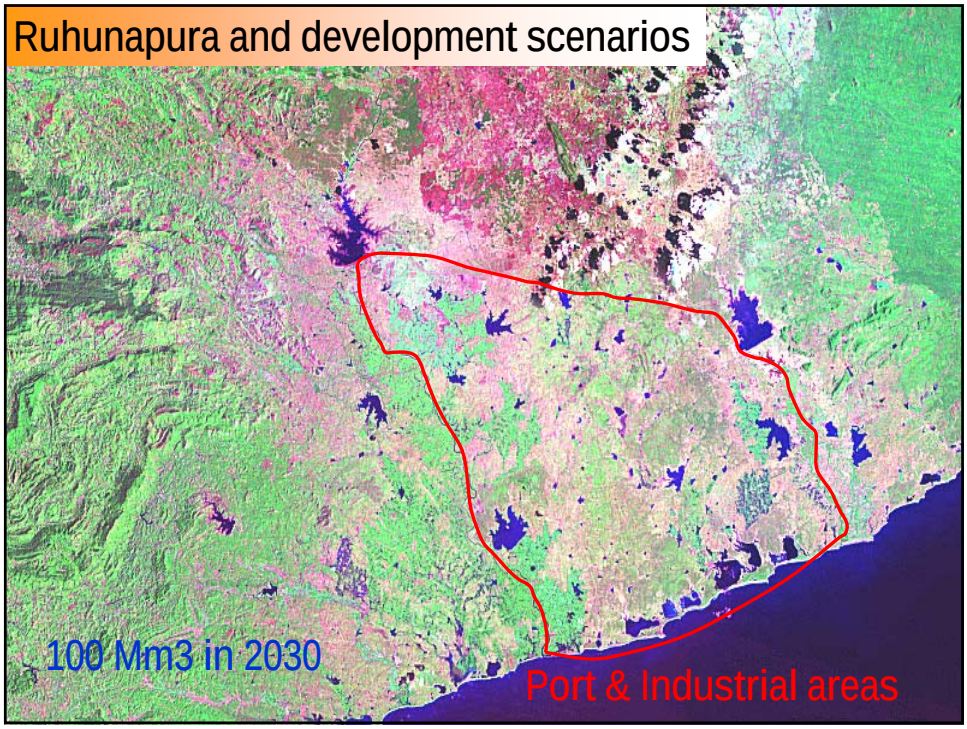
Ruhunapura and development scenarios



Institutions for IWRM

Organization	*Role*
Ministry of Irrigation & Water Resource Management * Irrigation Management Division	Policy formulation and national level decision making for management of water resource in Sri Lanka. Implementing Participatory Management policy in major irrigation systems in the country
Department of Irrigation	Designing, planning and construction of irrigation reservoirs and canal systems to provide irrigation facilities for farmers. Operation and Maintenance (O&M) of irrigation systems
Water Resource Board	Groundwater research & development of deep wells
National Water Supply & Drainage Board	Domestic water supply, improving drainage facilities in urban areas
Department of Agricultural Production and Development	Rehabilitation, operation & maintenance of minor irrigation tank / canal systems

Institutions for IWRM [Ctd..]

Organization	*Role*
Mahaweli Authority of Sri Lanka	Operation & maintenance of Uda Walawe reservoir and its canal system
Ceylon Electricity Board	Management of Samanalawewa Reservoir for hydropower generation & downstream irrigation requirements
National Aquatic Research Administration (NARA)	Policy formulation & national level decision making for fishery management in freshwater, costal & lagoon resources in Sri Lanka.(Research on Fishery industry related activities)
International Water Management Institute	A Future Harvest Centre and part of the Consultative Group for International Agricultural Research (CGIAR), focusing on sustainable management of land and water resources in developing world. Walawe is one of the IWMI Benchmark basins, which serve as field laboratories for research, capacity building and partnerships with multiple stakeholders

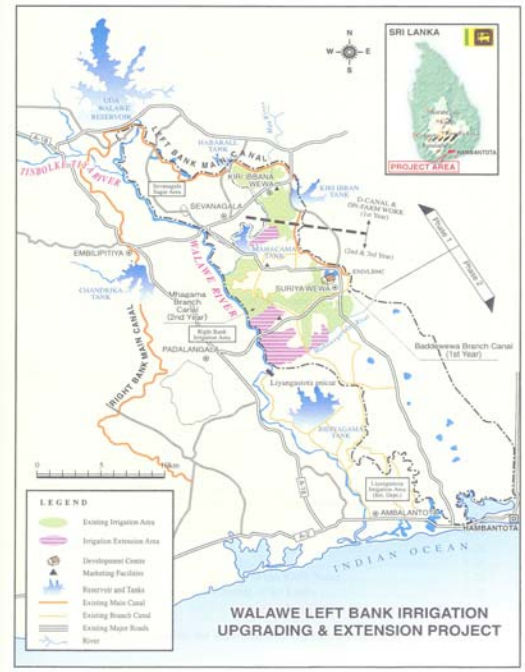
Main Issues and Challenges

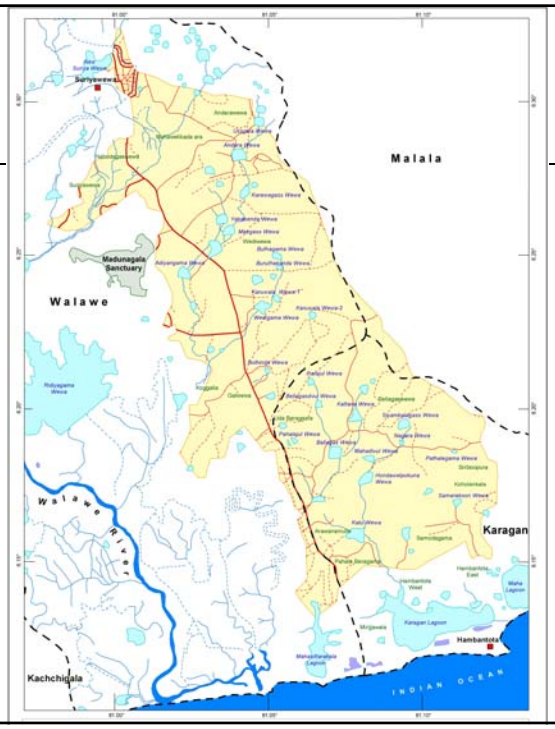
- **New water allocation & management in Uda Walawe**
- **Future diversion to Ruhunapura**
- **Afforestation impact on chena and hydrology**
- **New management in Kaltota**
- **Bio-diversity conservation**
- **« Intensification » of chena cultivation**
- Floods and Droughts: flood impacts are alleviated by the existence of a large number of surface storage tanks. Droughts occur every 3 to 5 years. Parts of the basin experience water scarcity problems during February - March and July – October in almost every year.

Basin Investigations

- Basin development trajectories
- Water productivity
- Water allocation and rights
- Equity and distribution of benefits
- Agriculture vs. environment
- Food production and security
- Institutions for basin level management
- The basin within its wider economic and political context

Left Bank Extension

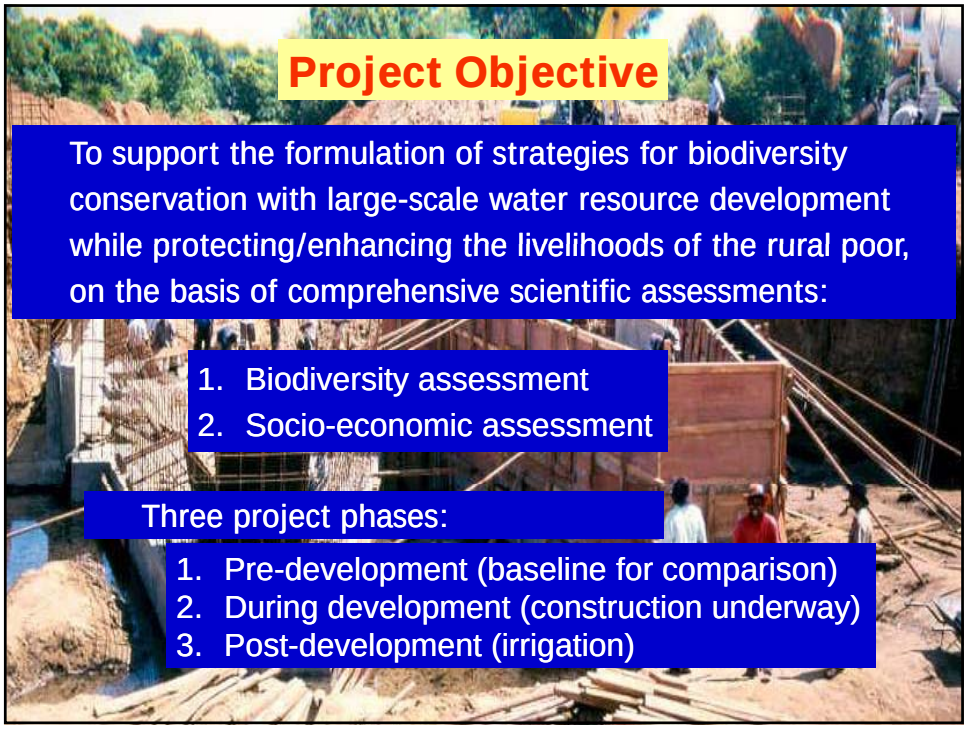




D – Canal Construction

F – Canal Construction

Land Reclamation Work

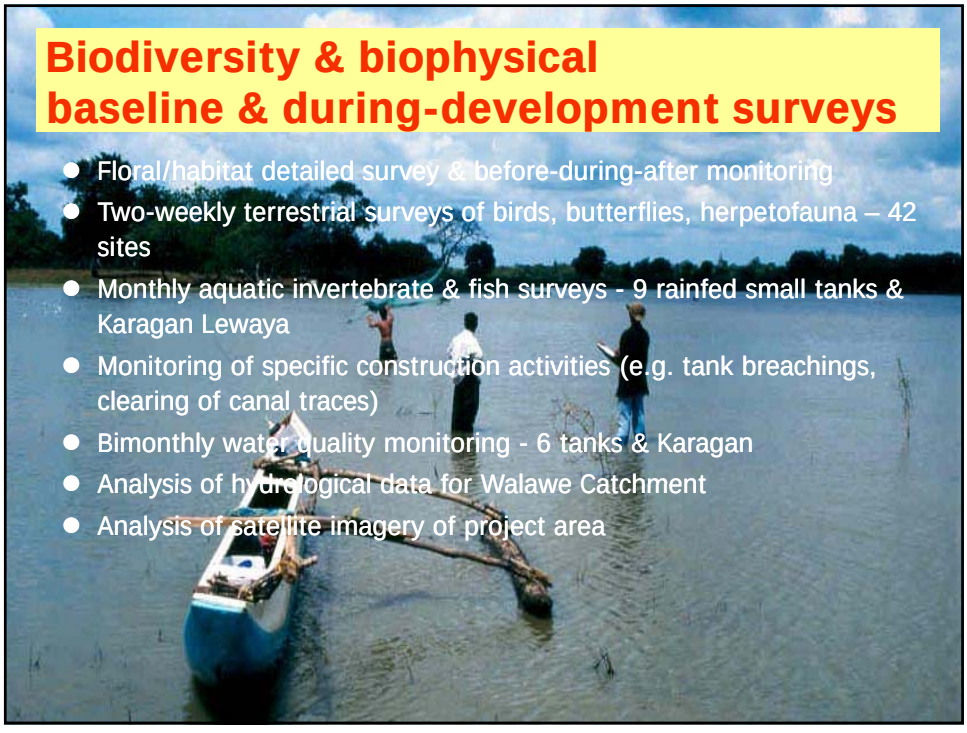


Floral biodiversity

- 7 major vegetation/habitat types:
  remnant degraded forest, chena, rock outcrop forest, dry thorny scrub, tank wetlands, home gardens, paddy
- 223 species of flowering plants from 56 families
- Species richness highest in rock outcrop & remnant degraded forest
- Species richness lowest in chena & paddy
- 10 invasive alien plants

Faunal biodiversity

Group	Fish	Amphibs	Reptiles	Birds	Mammals
Families	5	4	13	60	18
Species	13	16	40	205	25
Endemic (% of SL)	3 (9.4)	1 (2,9)	4 (4.4)	5 (21.7)	0 (0.0)
Threatened	2	2	10	15	4



Biodiversity & biophysical baseline & during-development surveys

- Floral/habitat detailed survey & before-during-after monitoring
- Two-weekly terrestrial surveys of birds, butterflies, herpetofauna – 42 sites
- Monthly aquatic invertebrate & fish surveys - 9 rainfed small tanks & Karagan Lewaya
- Monitoring of specific construction activities (e.g. tank breachings, clearing of canal traces)
- Bimonthly water quality monitoring - 6 tanks & Karagan
- Analysis of hydrological data for Walawe Catchment
- Analysis of satellite imagery of project area

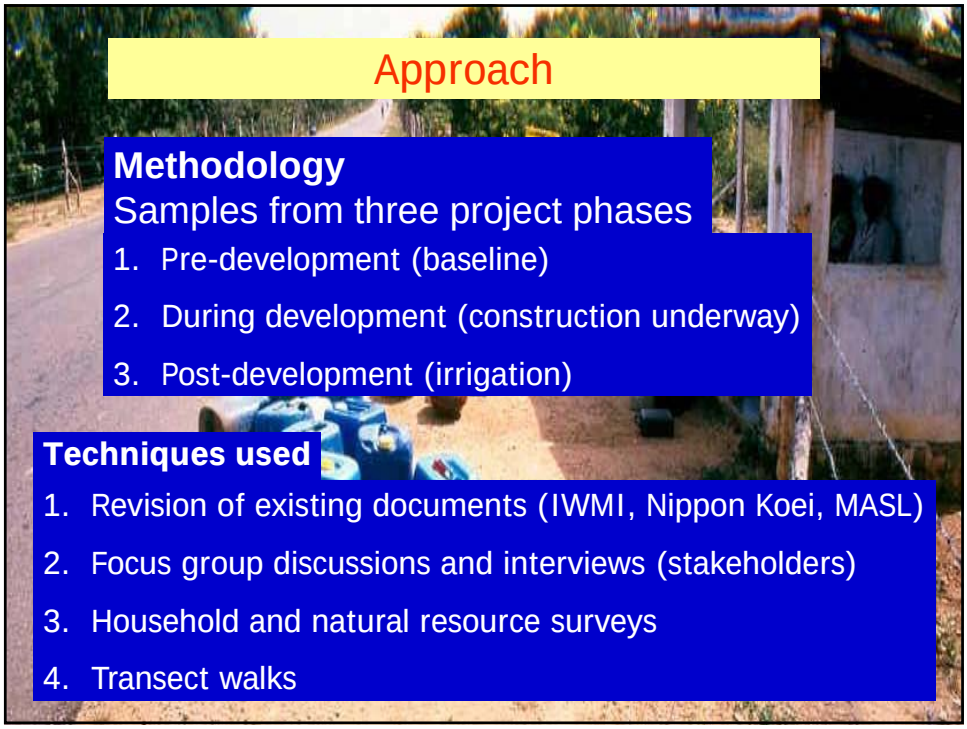
Some impacts on biodiversity during construction phase

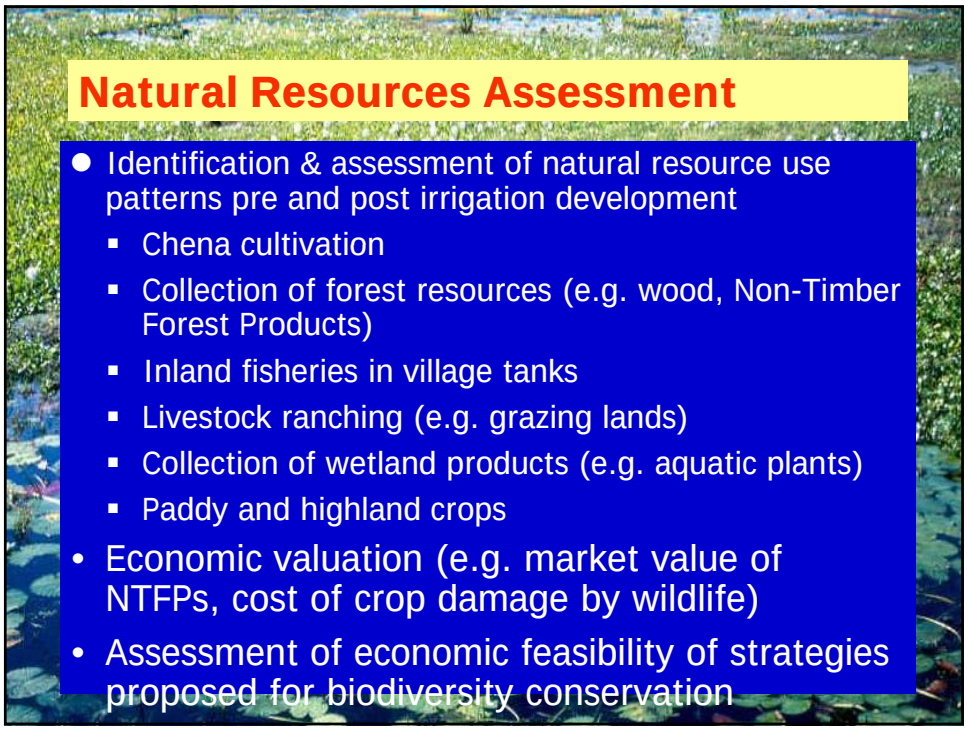
- Massive decreases in total area of natural/semi-natural habitat, increases in manmade habitats/infrastructure, increased habitat fragmentation
- Alien invasive species spreading rapidly (e.g. *Prosopis juliflora, Opuntia dillenii, Lantana camara)*
- Increase in illegal activities (e.g. poaching, logging, quarrying of rock outcrops)
- Large-scale loss of fish populations with tank breachings
- Local decline in numbers of forest birds
- Increase in number of animal road kills (e.g. *Limnonectes limnocharis*, *Calotes versicolor*, *Boiga trigonata*)

Socio-economic assessment

Objectives:

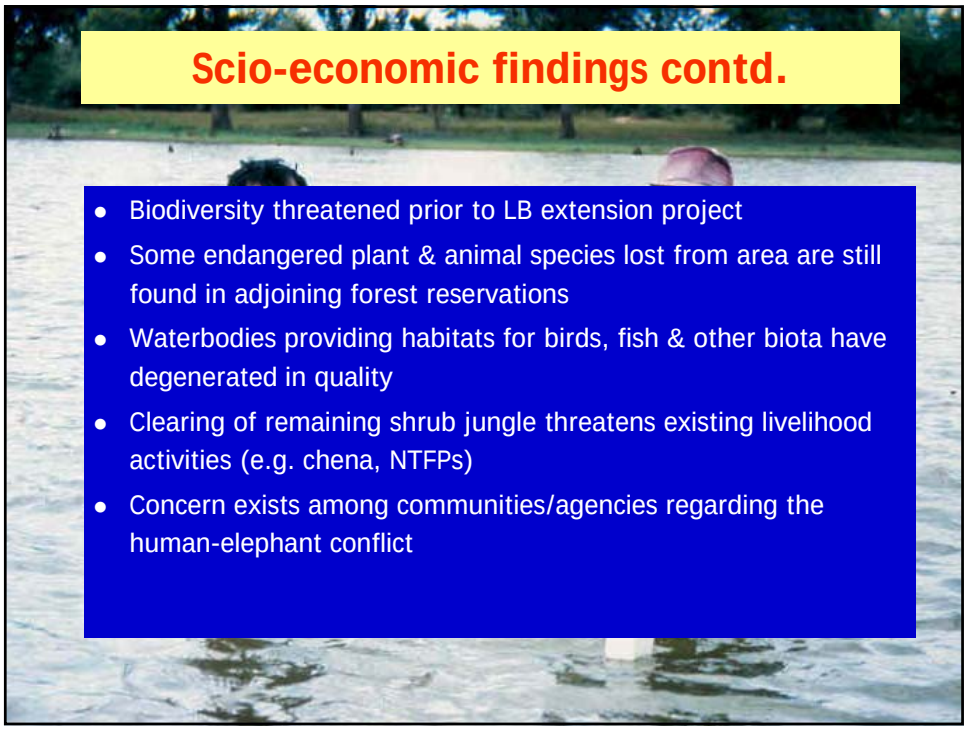
1. Assess socio-economic status of communities & livelihood dependencies on natural & manmade resources (historical - present - future)
2. Mobilise stakeholders to implement ecoagriculture concepts & rational use of natural resources, through action plans
3. Create stakeholder awareness of importance of biodiversity conservation in relation to maintaining sustainable livelihoods
4. Derive a generic methodology, lessons learned & appropriate intervention options for wider application


Approach
Methodology
Samples from three project phases
1. Pre-development (baseline)
2. During development (construction underway)
3. Post-development (irrigation)
Techniques used
1. Revision of existing documents (IWMI, Nippon Koei, MASL)
2. Focus group discussions and interviews (stakeholders)
3. Household and natural resource surveys
4. Transect walks


Natural Resources Assessment
Identification & assessment of natural resource use patterns pre and post irrigation development
Chena cultivation
Collection of forest resources (e.g. wood, Non-Timber Forest Products)
Inland fisheries in village tanks
Livestock ranching (e.g. grazing lands)
Collection of wetland products (e.g. aquatic plants)
Paddy and highland crops
Economic valuation (e.g. market value of NTFPs, cost of crop damage by wildlife)
Assessment of economic feasibility of strategies proposed for biodiversity conservation

Socio-economic findings

- Highest rate of chronic poverty (*JBIC- IWMI 2002*)
- Main livelihood activities:
  - Chena cultivation
  - Livestock farming
  - Paddy cultivation under village tanks
  - Collecting forest products
- Bulk of income (51%) from non-irrigated agricultural activities
- Newer families & greater number of dependents than upper LB area under irrigation
- Uncertainty prevails among communities (e.g. where they will be settled, whether land will be assigned & irrigation water provided)



Scio-economic findings contd.

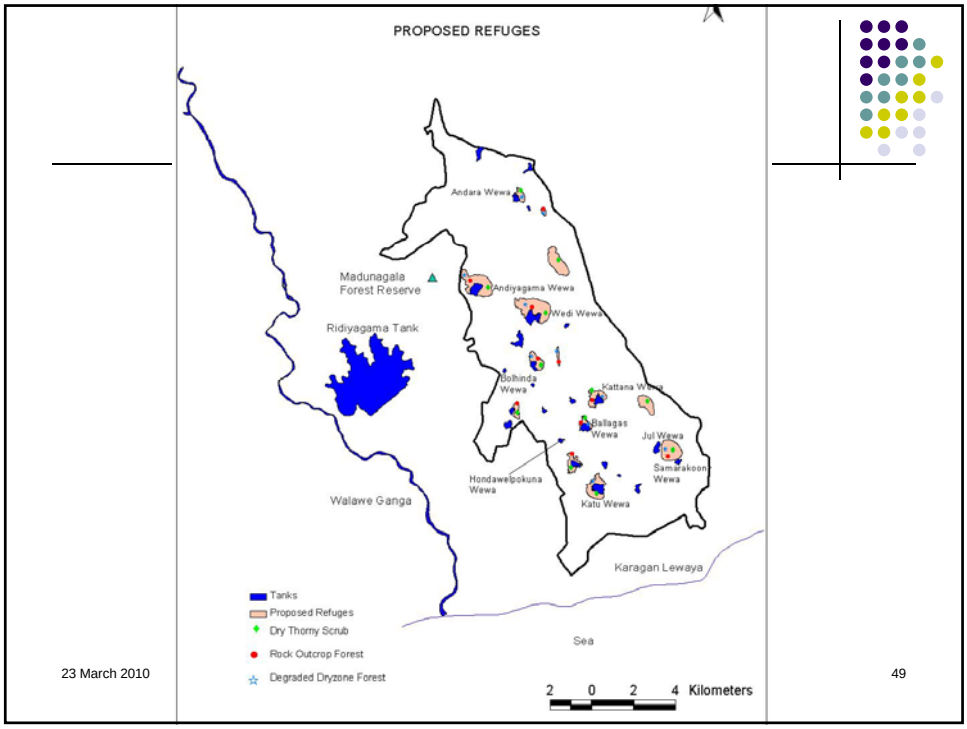
- Biodiversity threatened prior to LB extension project
- Some endangered plant & animal species lost from area are still found in adjoining forest reservations
- Waterbodies providing habitats for birds, fish & other biota have degenerated in quality
- Clearing of remaining shrub jungle threatens existing livelihood activities (e.g. chena, NTFPs)
- Concern exists among communities/agencies regarding the human-elephant conflict

Key Actions and Interventions

- Establishment of biodiversity refuges
- Biomonitoring of agroecosystem (feedback through progress meetings)
- Establishment of Biodiversity Park adjoining Bolhinda wewa (education, protected storage of genetic resources)
- Establishment of indigenous avenue & tank catchment plantations
- Designing of new & rehabilitated tanks to enhance waterfowl habitat

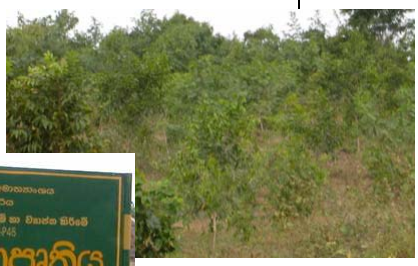
Key Actions and Interventions (Ctd..)

- Animal rescue operations from areas subjected to construction
- Awareness generation (TV documentary, media & community workshops)
  - Community based habitat restoration (e.g. management of invasive alien species, enrichment of remnant degraded dry zone forest)
  - Protection of elephants (& other large mammals) & mitigation of human-elephant conflict (monitoring elephant populations in project area, translocations to protected areas – separate linked project)


PROPOSED REFUGES
Andara Wewa
Madunagala Forest Reserve
Andiyagama Wewa
Wedi Wewa
Ridiyagama Tank
Bolhinda Wewa
Kattana Wewa
Ballagas Wewa
Jul Wewa
Samarakoon Wewa
Hondawelpokuna Wewa
Katu Wewa
Walawe Ganga
Karagan Lewaya
Sea
Tanks
Proposed Refuges
Dry Thorny Scrub
Rock Outcrop Forest
Degraded Dryzone Forest
2 0 2 4 Kilometers
23 March 2010
49


Implement Eco-agriculture Strategies
Land-use systems managed for both agricultural production & wild biodiversity conservation
Maximise habitat connectivity through hedgerows linking uncultivated spaces (wildlife refuges in intensively managed landscapes, weed/livestock barriers, windbreaks, IPM refuges)
Reduce habitat destruction by increasing agricultural productivity & sustainability on lands already being farmed
Enhance wildlife habitat on farms
Ensure links to nearby protected areas
Mimic natural habitats by integrating productive perennial plants (e.g. multi-vegetation home gardens)
Modify resource management practices to improve habitat quality in & around farmlands
Use farming methods that reduce pollution (e.g. organic farming)

Fuel Wood & Avenue Tree Plantation



Community Participation in Tree Planting

Bio-diversity Park

Programmes for Agriculture Development

Farmer Demonstrations under Micro Irrigation




Agricultural Development

Before **After**


Uplifting the Living Standards

Expansion without Extinction

- Irrigation Development – a main strategy in socio-economic development
- Poverty Alleviation
- Livelihood Development
- Impact on Environment and biodiversity
- Ecosystems and habitats are cleared
- Livelihood systems depending on natural resources are affected

Strategy Development

- Factors influencing biodiversity and related socioeconomic conditions are multiple, interwoven and interdependent in the context
- Scientifically sound methodologies are required to understand them in order to help develop strategies, approaches and actions for biodiversity preservation and livelihood enhancement in irrigation development projects.
- Natural Scientists and Social Scientists need to interact
- Collecting data on biodiversity and socioeconomic aspects and their interactions
- Awareness creation and knowledge building of stakeholders for participation