

# Water Resources Management in a River Basin

## Institutional Gaps & Implications

### Case Study of Deduru Oya River Basin - Sri Lanka

This article analyzes the capacity of existing institutions in the Deduru Oya river basin in managing its water resources for improved performance and sustainability. The term "institutional capacity" is defined here to include policies, rules regulations, acts, organizations (formal and informal) and strategies to manage land and water resources in a basin. The analyses presented in this article are relevant to the other river basins in Sri Lanka and developing countries in Asia.

The analysis is based on information collected by the authors for the study on Deduru Oya basin carried out by the International Water Management Institute. Several data collection methods were employed. These included stakeholder consultations, collection of secondary data from line agencies, and formal and informal interviews with key stakeholders. In addition, this paper utilizes information from the water balance study carried out in the basin.

#### 2. Sallent Features of the Deduru Oya river basin

The Deduru Oya River originating from the eastern border of the Central province is the main water source in the basin. It runs across Kurunegala and Puttalam districts and enters the sea at Chilaw. The total length of the main stream of the river is about 115 km. And comprises of 9 tributaries. The total land area falling under the basin is about 2,600 square km out of which 3% is in Central province (Kandy and Matale districts) and the rest in the Northwestern province, 88% in Kurunegala and 9% in

Puttalam district. The total population in the basin area is about 9,70,911. Nearly, 50% of the families in the basin are below poverty line and receive poverty alleviation assistance under Samurdhi program from the government. According to the poverty indicators adopted by Samurdhi program about 10% of the total families receiving Samurdhi benefits fall under the absolute poverty category.

From ancient times water resource development in the basin has traditionally been for agriculture. At present there are four major irrigation systems, several medium schemes and nearly about 3,000 minor tank systems in the basin that provide irrigation for about 50,000 ha (18% of the developed area in the basin). The major systems are confined

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to middle portion of the basin where river diversion schemes have been constructed. The medium sized schemes and minor systems are spread-out throughout the basin. In recent years there is widespread development of groundwater. There are about 2,500 shallow wells in the basin. More recently, in response to water scarcity, farmers resort to pumping water directly from the river and its tributaries. It is estimated that there are some 2,000 - 2,500 such pumps that operate each season.

Pipe-borne water for domestic use is available for only for 5% of the population in the basin area. Others depend on tube wells constructed by the central or local government bodies or the shallow wells constructed by the people themselves. To provide pipe-borne water 37 schemes have been constructed

and there are 1,200 tube wells constructed to provide domestic water facilities for the people.

#### 3. Main problems in Managing water resources in Deduru Oya basin

This section summarizes some of the main problems encountered in the basin. They are as follows:

✓ Temporal and spatial differences in productivity of irrigated agriculture. The cropping intensity (CI) and the yields significantly varies spatially and seasonally. The CI and yields are higher in major irrigation systems than in small systems. Paddy yield in major systems ranges between 4.5 to 5 MT per ha while in the minor systems it ranges between 1.25 MT to 3 MT. per ha. The differences in these systems are associated with water scarcity and problems in agricultural support systems.

✓ The supply of safe drinking water is another major problem. Some water bodies such as main tributaries of the river is heavily polluted and can not be used as sources for augmenting domestic water supply schemes (e.g. Maguru Oya that has potential for augmenting a domestic water supply scheme in Wariyapola DS area is heavily polluted). As a result of unplanned urbanization process pollution of surface water through sewage and solid waste disposal can be observed in many urban and semi-urban areas.

✓ Deterioration of the natural environment due to various unplanned development activities is a serious threat to the sustainability of the natural resource base. Deterioration oc-

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**Table 1 - Threats for the Eco-systems in the basin**

Activity	Implications on the environment
Fresh water pollution	Diminishing of limited and potential natural water bodies that can be tapped for augmenting domestic water supply schemes for the people in need of good quality drinking water.
Shrimp farming at the coastal area of the basin	Fresh water pollution, soil deterioration and diminishing of coastal eco-system and plant species like mangroves etc.
Sand mining	Riverbank erosion, Salt-water intrusion in to the interior areas, and depletion of ground water levels.
Development on the river reservation	River bank erosion, increasing mosquito population
Unregulated agro-well development	Reduction of recharge and decrease of productivity in agro-wells.

curs mainly due to unplanned urbanization which leads to solid waste and waste water discharge in to surface water resources, unregulated sand mining in the river and tributaries, undesirable development activities such as brick making, cultivation etc. in river bank areas, shrimp farming in the coastal area and unrestricted agro-well development. Table 1 illustrates the impact of these activities on the eco-system of the river basin.

**4. Existing Institutional mechanisms in managing water resources in the basin**

A hierarchical and multi-sector organizational structure exists in the country that deals with development and management of water resources (Table 2).

In addition, as shown Table 3 there are several other organizations at district, divisional and grass-root level that are involved in water based development activities such as agriculture, livestock and inland fishing development.

Apart from different organizational arrangements there are Acts and Ordinances indicating rules and regulations for the use and utilization of land and water resources. Some of the

more important legislative enactments are given in Box 1.

**5. Institutional gaps and problems in solving existing and future problems**

The description on existing institutions in section 4 indicates that Sri Lanka has hierarchical and multi-sector organizations and coordination arrangements for water resources development and management. Nevertheless, the following gaps are observable in the existing institutional mechanism of the country:

- ✓ Non-availability of an institution at national level to integrate various functions related to the development, utilization and sustainable management of water resources.
- ✓ Existing sector agencies are not oriented for managing water resources in a basin context. Each sector organization is responsible for performing the tasks assigned to it. The growing problems such as water scarcity and rapid deterioration of quality of water and natural eco-systems in river basins do not fall within the agenda of these organizations and not serious concerns for them.
- ✓ There is no mechanism to ensure proper enforcement of the rules and regulation for the protection of water resources and environment

(protecting rivers and riverine resources etc.).

**6. Policies, strategies and organizational changes proposed**

It is now widely accepted that the river basin is the most appropriate unit for the development and management of water resources. Therefore, we should have sound policies, rules and regulations as well as organizations and management strategies to manage river basins in a sustainable manner for the use of growing population. With rapid increase of water based development activities there is a growing competition for water on one hand while on the other hand a depletion and deterioration of water resources are on increase. Coping with water scarcity has become a challenge for all the stakeholders in river basins. Since these problems are related much to the institutional and organizational gaps, changes are required in the existing organizations to fill these gaps to find solutions to the resource management problems. The following institutional reforms are likely to address many of these problems:

- ✓ Establishment of National Water Resources Authority as proposed by the Water Resources secretariat (National Water Resource Policy and Institutional Arrangements – 2001). At present there is no institution to integrate the water resources development and management programs and projects implemented by various line agencies and other organizations. The proposed National Water Resources Authority in Water Resource Act referred above may be able to fill the existing institutional gaps through the establishment of Water Resource Council, Water Resource Tribunal and the River basin Organizations (RBOs). New institutional changes should not weaken the existing arrangements and should contribute to improve the integrated water resources management efforts at national level. It should be an organization with power, authority and ac-

**Table 2. Organizational arrangements for water resource management**

Level	Organization	Overall responsibility
National	Mandatory of water resources	Responsible in policies, macro-level planing and development of water resources especially water resources development for irrigated agriculture
National, District and divisional	Departments of irrigation (ID), Agrarian Services (DAS),	ID is responsible for development and management of major and minor irigation development in the country
National	Water Resources Board	Responsible for ground water research, development and monitoring etc
National, District and divisional Provincial level	Water supplies and drainage board Ministry of water resources	Development and distribution of water for domestic use Responsible for policies and strategic development within the province
Provincial	The provincial irrigation Department	Help farmers to improve and rehabilitate small irrigation systems on the request from Agrarian Services Dept.

## Box 1 - Key Laws and Regulations

Enactment	Date	Key Provisions	Agency/Agencies responsible for implementing legal provisions
The Irrigation Ordinance No. 32	1946	The Irrigation Ordinance provides for the regulations for the Divisional Secretaries (DSs) to prepare plans for new major irrigation schemes or introducing changes to the existing ones. The approval of the Minister is required to prepare plans for the major irrigation schemes in terms of this ordinance. Also the ordinance provides for the regulation for holding cultivation meetings in major irrigation schemes. There are provisions to take seasonal cultivation decisions at a special meeting of an IMD Project Committee attended by DS.	Minister of Irrigation, DS, IMD PC
The Crown Land Ordinance (The State Land Ordinance)	1947	The right to use, flow, management and control of any public lake is vested in the state under this ordinance. It makes a distinction between public water and private waters. Part IX of the ordinance provides for the regulation and control of public waters and streams through system of permits. Water for irrigation is exempted from licence requirements.	DS
The Electricity Act No. 19 (as amended)	1950	This Act provides for the licensing or installation for the generation of electricity. These licences confer all rights necessary for the purpose of electricity generation, including rights to use water.	Ministry of Irrigation and Power
The Soil and Water Conservation Act	1951	This Act empowers the Minister of Agriculture to declare areas subjected to soil erosion as erodible areas. The Minister may make regulations applicable to these areas requiring the owners of land to take measures to afforest the banks or watercourses or to maintain a strip of land along the banks of watercourses free from cultivation.	The Minister of Agriculture
The Agrarian Service Act (an amendment and continuation of the Paddy Land Act No. 1 of 1958)	1979	Provides provision for tenure security in irrigated lands and sound management of agricultural activities and water in small tank systems through Agrarian Service Committees and Farmer Organizations etc.	Commissioner of Agrarian Services
The Mahaweli Authority of Sri Lanka Act No 23 (as amended)	1979	This Act empowers the Mahaweli Authority to use and develop the water resources of the Mahaweli River.	The Mahaweli Authority
The National Water Supply & Drainage Board Act No. 2 (as amended)	1974	This act empowers the National Water Supply and Drainage Board (NWS&DB) to direct and use water to provide water supply for public, domestic and industrial purposes without other approval.	The NWS&DB
The National Environment Act (as amended)	1988	Provides provisions for environmental pollution control including the pollution of water and protection of sensitive habitats like lagoons and lakes etc.	The National Environmental Authority, (Authority over some activities has been delegated to Provincial Environ. Authority)
Participatory Irrigation Management Policy	1968	Provides direction for handing over of full responsibilities over O&M and resource mobilization below Distributory Canals to Farmer Organizations	Irrigation Management Division and Irrigation Department
Mines and Mineral Act	1992	Section 30 of the Act provides provisions for imposing restrictions on the issuance of mining licences if the mining is to take place in the proximity of water bodies.	Geographical Survey and Mines Bureau

countability for the sustainable use and utilization of water resources in the country.

Table 3 - Sub-national Organizations for Water Resource Management

Level	Committee	Basic functions
District level	District development committee and District agriculture committee (Development committee is chaired by a politician in the district) and the agricultural committee is chaired by the District secretary	Provide some strategic guidelines for planning and monitoring of development activities including agriculture
Electoral or Divisional	Electoral level committee is chaired by the respective MP of the ruling party and coordinates infrastructure development. Divisional agricultural committee is chaired by the Divisional Secretary coordinates agricultural programs in the division.	The same functions as District level
Grass root	Agrarian service committees	Provide support for the farmers for coordinated acquisition of inputs and services required for agriculture and also to implement rules and regulations in the agrarian services act

✓ Establishment of river basin organizations based on one or several basins. Under the present system there is no single organization that is accountable for the sustainable use of water resources in the basin as a whole. Each agency is implementing different activities and working to achieve their individual targets. The regulations for protecting riverine resources are not being properly implemented mainly due to the absence of an organization accountable for ensuring the sustainability of resources in the basin. Also, there is growing compe-

tion among different water uses. There is a need for appropriate institutional arrangements to deal with the negative implications of the competing demands of different resource users. RBOs proposed in the National Water Resource Policy may be able to fill all these existing institutional gaps.

- ✓ Institutional reforms are required for the three different existing coordination committees in the basins. At present these committees mainly focus on agriculture related coordination and not much involved in integrated water resource management activities. For this purpose it is required to Strengthen the District and DS level agricultural committees and Agrarian Service Center level

committees as coordinating bodies for water and other natural resource management by introducing necessary amendments to existing rules and regulation.

- ✓ Introduce provisions to make the line agencies accountable to the RBOs
- ✓ Establishment of a monitoring cells at District and DS levels to monitor the progress of resource management activities.
- ✓ Introduce clear procedures for evaluating the performance of line agency officers
- ✓ Introduce legislation to provide legal recognition to the proposed committees

- ✓ Efficient water management in water abundant schemes

- ✓ Institutional development at ASC level for better O&M at minor irrigation systems

- ✓ Testing of the proposed institutional model in one or several river basins using participatory watershed approaches to learn lessons for replication in other river basins in the country.

#### **References -**

1. *IWMI Draft reports on Deduru Oya Basin - Unpublished*
2. *National Water Resource Policy and Institutional Arrangements - 2001 - Water Resource Council and Secretariat, Government of Sri Lanka*