Ruhuna Basins (Sri Lanka)

[Based on information provided by the Ministry of Irrigation and Water Management of Sri Lanka]

General context

Location and major physical characteristics

Located in the south of Sri Lanka (65,500 km², 19 million inhabitants), the Ruhuna basins comprise three main rivers (Walawa, Menik Ganga, Kirindi Oya) and several smaller basins, and form part of the hydrologic system of the ancient kingdom of Ruhuna. They cover 8% of the landmass of the country and are inhabited by a little over 1 million people. They are mountainous and relatively wet.

Paradoxically, however, the major part of the basins sits within the so-called dry zones, which receive less than 1250 mm rain annually. The major natural hazard is drought. The only source of water is rainfall. Monsoonal rains during the Maha season (November to March) and the Yala season (May to September) contribute a major part of the annual rainfall, which is supplemented by inter-monsoonal rains. During the Yala season drought probability increases to 32%. The amount of rainfall reduces from the upper reaches to lower reaches and from west to east. The recent rainfall records at selected stations show a trend of decreasing annual rainfall since 1970. The ambient temperatures in the lowland range from 25 to 28°C and in the upper elevations from 23 to 25°C.

Major socio-economic characteristics

Population

The Ruhuna basins include parts of Ratnapura, Badulla, Moneragala, and Hambantota districts with population densities of 307, 291, 71 and 217 persons per km², respectively. The total population in the basins is approximately 1.1 million.

The average monthly income per household in Badulla district is the lowest in the country. For the year 2000 average GDP per capita was US$850, but for the Ruhuna basins per capita GDP was estimated at about US$600. The percentage of households receiving food and economic support was 60% compared to the national average of 39%.
**Economic activities**

Tea and rubber are grown as commercial crops in the upper basin area, and rice is the major crop in the plains. The major land use types in the basins are: forests (29%), scrubland (26%), shifting cultivation (chena) (23%), paddy (10%) and home gardens (12%).

**Water and cultural background**

During ancient times, the Ruhuna, apart from being a sub-kingdom, served as a safe-haven for people fleeing from foreign invasions. Agriculture played a major role in the economy as well as in national security. Water resources development efforts in the area, as in other parts of the country, focused on irrigation. With rainfall being concentrated during the two main seasons, varying greatly from one year to another, there has been a major effort to construct a large number of reservoirs. From ancient times water was used for recreation, sanitation and hygiene leading to recognition of the high value of water resources to the community.

**Water resources**

**Hydrology**

Kirindi Oya basin is the most water-stressed of the Ruhuna basins (see detailed map). It has the lowest per capita surface runoff, relatively high flow requirements for environmental purposes, and many farmers face serious water problems.

Many people in the basins depend on shallow groundwater for their domestic needs. Studies indicate that seepage losses from canals and reservoirs have been indispensable for maintaining water levels in shallow wells. Reliance on groundwater, measured as the ratio of average annual groundwater withdrawals to the total average annual withdrawals, is 3%. High vulnerability to declining groundwater levels and salt water intrusion exists in the lower reaches of the basins.

**Human impacts on water resources**

Water resources in the basins are highly regulated to support the generation of hydro-power and irrigation. There are 20 large reservoirs (three having a capacity over 100 million m$^3$) and about 280 smaller reservoirs, giving a total storage capacity of about 900 million m$^3$. There are numerous river diversion systems, mainly for irrigation.
Changes in land cover will affect water resources. About 2,720 km² is under forest and scrub land cover. In Walawe and Kirindi Oya basins substantial development works have been carried out and the forest and scrub cover has been reduced by 30% and 23% respectively over the past 40 years, which is a higher rate of land use change than the national average.

**Water needs, uses and demands**

**Water for basic needs**

The present level of access to safe water is about 60% and access to adequate sanitation is about 71% of the population in the basins. National coverage of the above services are 75 and 73% respectively. Some of the major towns in the basins obtain domestic water from irrigation reservoirs while other towns abstract water from the river itself.

Although the return flow from agricultural lands helps to maintain minimum flow requirements during the dry months in the Walawe sub-basin, water quality is poor due to the presence of agrochemicals.

**Water for food**

The major food crop in the basins is paddy, cultivated in about 52,000 ha of which 90% is irrigated. Normally two crops can be grown during the year, one at the Maha and one at the Yala season. The water used by major irrigation systems is about 1500 mm in Maha and 1800 mm in Yala seasons. However, a proportion of these releases is used indirectly by small irrigation systems and for domestic use, so actual irrigation applications are lower. Withdrawals for irrigation are more than 95% of the total.

The basins produce large amounts of marine fish, inland fish, cow milk and buffalo milk. Inland fisheries are becoming popular and are receiving support from the Government, and are an important source of protein for the rural population.

**Water for ecosystems**

Besides the agricultural wetlands, comprised of paddy fields, the basins also includes several important reserves, the Ruhuna, Uda Walawe, Bundala National Parks, as well as the lagoon systems adjacent to Bundala park and a large number of man-made reservoirs.

- Sri Lanka's first Ramsar Convention site, **Bundala National Park**, spreads over an area of 6,216 ha. This area is designated as a Sanctuary under the Flora and Fauna Protection Ordinance. Four shallow, brackish lagoons form the major part of the Park. Bundala is the most important wintering area in southern Sri Lanka for migratory shorebirds, sometimes accommodating about 20,000 birds. Elephants and leopards are also found in Bundala.
• Ruhuna National Park is one of the largest National Parks in the country, covering some 126,000 ha, some of which lie outside the basins. Most of the wetlands in the Park are well protected.

The total land area protected under relevant legislation is about 1,200 km², about 21% of the basins area. Water use by ecosystems is the highest in Menik Ganga, which flows through the Ruhuna National Park.

Water for industry

No major industrial activities occur in the basins at the moment, and water withdrawals are estimated as being less than 1% of the total withdrawals.

However, major changes are expected when the proposed Ruhunupura City development, which will include an airport, industrial and commercial areas and a commercial harbor, is implemented. The water requirements of Ruhunupura are estimated as amounting somewhere between 100 and 150 million m³ annually.

Water for energy

The hydropower generation facilities in the Ruhuna Basin are only in the Walawe sub-basin. Uda Walawe reservoir, constructed in the 1960s, has an installed hydropower capacity of 6 MW. The installed capacity of the hydropower plant at Samanala Wewa is 120 MW, which is about 10% of the total installed capacity in Sri Lanka. Water used for generation is recaptured downstream for reuse by irrigated agriculture, power generation and other uses in the downstream reaches.

In 2001-2002 Sri Lanka faced a major power crisis resulting in power cuts up to 8 hours a day during several months for the entire country. The drought, in combination with the very high share of hydropower to total power requirements (65%), were the main reasons for this.

Water management

A tradition of water management

In Sri Lanka, the historical background of the country has helped create the perception that water is a public good, and that agriculture is a tradition, in addition to being a major component of the livelihood strategies of the population. A local management structure for water resources was developed which included provisions for cost recovery and regulation. These provisions enabled a self-sustaining rural agrarian society to exist in the villages.
The broad recognition of centuries old water traditions in Sri Lanka and with a considerable number of people still living below the poverty line makes understanding that water has social, environmental and cultural values in addition to economic value very important. For example in the numerous minor irrigation networks, the systems provide water for domestic use and livestock, wildlife, and recharge of groundwater while enhancing the village environment. These multiple dimensions to the value of water must be considered equitably in water resources planning, development and management. The social and cultural norms established within the society have, for a long period, placed great emphasis on the optimum use and prevention of wastage of this vital resource.

**Demand management: the major role of irrigation**

Demand management has been given special attention in recent government policy. In the domestic water supply sector targets include minimizing unaccounted water and the introduction of demand management measures. In the energy sector, there are campaigns to reduce power consumption.

Several opportunities exist for improving water use in agriculture. Increased re-use of irrigation return flows, diversification of crop patterns to include a higher proportion of crops consuming less water, improvement of conveyance systems, better canal operations and field application methodologies are being introduced in the basins. Two donor-funded rehabilitation projects are also supporting initiatives to increase productivity of the irrigation systems in the basins, which are expected to enhance productivity and water use efficiency.

**Drought management: a main issue**

The recent droughts severely affected many parts of the basin, leading to reduced water for irrigated agriculture, insufficient domestic water supply, and nationwide power cuts up to eight hours a day. In response, the government has initiated a range of measures to mitigate the impact of future droughts. These include short-term emergency measures, such as development of groundwater for emergency domestic supplies; medium-term interventions such as introducing better water management practices; and longer-term studies on the possibility of inter-basin water transfers. Drought management decisions in agriculture are taken in the seasonal meeting where farmers and officers participate. Typical decisions include cultivation of a reduced proportion of the command area and sharing the land. In general, domestic water needs are given the highest priority during droughts, a policy that will be formalized with passage of the proposed National Water Resources Policy.
Major challenges for the future: managing competing demands

The Ruhuna basins will face major changes over the next two decades, indicating that the dominant role of agriculture in the region is likely to change towards much more industrial and service-oriented activities. Most recent development plans show that the use of water for cities and industry will increase from the current less than 10 million m³ to 100-150 million m³ by the year 2025.

Similarly, threats to the environment through pollution and encroachment on protected areas could increase. The coastal lagoon systems in the basins are close to areas of high population density and further expansion of industries is being planned in these areas. The major challenge for the future is managing competing demands whilst protecting the ecosystems. Unless legislation and support for implementation are adequately planned, degradation of the ecosystems is likely to increase in the future.

Threats to ensuring adequate water supplies for basic needs include pollution by industries and agriculture, and problems of distributing water during drought periods.

Although production of rice exceeds consumption within the basins, malnutrition continues to be a challenge for social welfare. The levels of stunted, wasted and underweight children in the Hambantota and Moneragala Districts remain comparatively high, although substantial improvements have been made during the last decade. High levels of poverty will affect the sustainability of water resources management interventions, leading to a vicious cycle where water and land degradation restricts income, thus leading to further poverty.

Useful links and contacts

Read the complete case study, published in the in the first edition of the UN Water Development Report (WWDR).

To know more about the Ruhuna Basins, here is a list of interesting projects and organizations:

- Ministry of Irrigation and of Water Management of Sri Lanka: basic information and contact details.
- Environment Sri Lanka