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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Demand responsive water supply in Sri Lanka

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THE SRI LANKAN government has committed itself to introducing a participatory integrated approach to water resource management to meet a growing water resource problem in the country. Here the Menik Ganga catchment in south east Sri Lanka is used as an example of the problems that need to be addressed by the new policy.

The Sri Lanka problem

The average annual rainfall in Sri Lanka exceeds 1500mm per year and hardly anywhere does it fall below 1000mm; in highland areas it is over 5000mm. To suggest, therefore, that Sri Lanka has a water-resource problem might seem difficult to believe; however problems do exist. Rainfall is strongly seasonal and in the drier north western and south eastern parts of the island there are water shortages during the months of June, July and August when low rainfall is combined with high evaporation rates. Groundwater resources that are of poor quality and limited extent compound surface water shortages in these regions.

It would be too extreme to claim that Sri Lanka is suffering a water resource crisis, but serious seasonal water shortages combined with an ever-increasing demand in the wake of rapid economic development provide a warning sign of increasingly severe problems to come.

In recognition of this fact the Sri Lankan government in April 2000 set out the future policy for water resource management in the country in a document entitled ' The National Water Resources Policy and Institutional Arrangements'. The overall objective of the policy is to ensure that future water resource management ensures *'the use of water resources in an effective, efficient and equitable manner, consistent with the social, economic and environmental needs of present and future generations'*. A particular stress was placed on the need for integrated water resource management at the river basin scale with active participation of local communities in the decision-making processes.

An excellent example of why this type of approach is required is provided by the problems currently being faced in the Menik Ganga(River) catchment in south east Sri Lanka.

The catchment

The Menik Ganga(River) rises in uplands 1600 metres high, from where it flows approximately 80 kilometres to the coast; the total catchment area is 1272 square kilometres (refer table 02). Average annual rainfall varies enormously from over 2500 millimetres in the headwaters to less than 1000 millimetres at the coast. In the headwaters tea plantations dominate land use, but in the central section cultivation is given over chiefly to paddy and sugar cane; in contrast the lower third of the catchment forms part of the Yala National Park.

Groundwater occurs in basement complex gneisses, which form aquifers of low yield, producing water of generally poor quality.

Demand and conflict

The estimated volume of water discharged annually by the Menik Ganga at the coast is 298 million cubic metres (refer table 02). But this impressive discharge is not evenly distributed throughout the year. During the months of June, July and August the flow is dramatically reduced and in recent years has ceased completely for several weeks at a time in this dry period. But this is precisely the time when the water demand of the 271,000 population is at its highest.

The demands stem from a number of sources, but principally from the paddy farmers and sugar cane producers who are based in the area. Sugar cane producers need water to irrigate the nursery crop and for factory processing, while the paddy farmers require the water to produce their second (Yala) crop. At the same time settlements such as Buttala and Katteragama use the river to provide a domestic water supply (Figure 1). In the case of Kateragama, located in the lower part of the catchment, the problem is made worse because as a sacred site it attracts over 100,000 pilgrims during the holy season, which incongruously occurs during the dry months of July and August. The Yala National Park, situated in the lower third of the catchment, also requires a dry season supply of water to sustain its wildlife, including a large elephant population, during the dry season.

Currently large-scale abstractions from the river either via diversion channels (anicuts) to the paddy fields, or by pumps to the sugar cane nurseries and town water supply systems is not coordinated or controlled on a catchment wide basis. The inevitable result has been conflict between the major users and those minor users who also depend on the river during these dry months (refer table 03). Under these conditions it is not surprising that it is the downstream users, notably the Kateragama domestic supply and the Yala National Park, that have suffered most.

Water Quality

In addition to the problem of water quantity there are also a number of water quality issues to be resolved. Chief among these is the threat to the quality of the river water itself. Tea cultivation which takes place mainly in the headwaters poses a double threat; firstly in the form of pesticides used on the crop being washed into the river and secondly by tea estate workers settling along water channels but having no access to proper sanitation. Faecal pollution has resulted from this practice.

Further downstream the sugar factory and distillery have been accused of either deliberately or inadvertently discharging polluted water into the main channel causing problems for paddy farmers and domestic water suppliers further downstream.

To compound the situation much of the groundwater present in the catchment also suffers from severe quality problems. Excessive hardness and high iron content is widespread, while locally fluoride levels are well in excess of permitted WHO limits. Shallow supplies tend to be of better quality, but crucially most dug wells tend to fail in the dry season and the population need to turn to the deeper tube wells, which unfortunately produce water of poorer quality.

The way forward

Clearly, water resources in the Menik Ganga catchment are not being managed in the effective, equitable, efficient and sustainable manner that is required by the recent national water resource policy. The problem is to convert what is a chaotic and *ad hoc* method of allocation and distribution into a fully integrated water management system. To successfully achieve this long-term goal will require the adoption of some basic guiding principles.

- The first and probably the most important is the need to involve local communities into the management process. This participatory approach has been used with great success in India where for over 30 years watershed development programmes have transformed previously poorly - managed catchments into sustainable, productive regions. Many of these schemes were described in the October 2000 edition of Waterlines. A similar participatory approach will be required to successfully implement any integrated water management policy in the Menik Ganga. Involvement and participation of local communities provides the best way forward to overcome the conflicts that will inevitably arise in any management system.
- Water management in Sri Lanka is presently based on administrative districts and divisions. An effective management strategy, however, really needs to be based on the hydrological unit, the catchment. To achieve this aim will require some fundamental institutional restructuring.
- The water resource in the catchment needs to be accurately quantified; without knowing how much water is available makes effective water resource management impossible. A comprehensive hydrological monitoring network including meterological stations, groundwater monitoring points and flow gauging stations is therefore essential.
- A good decision making support system is required. Integrated management means that the impact of a wide range of factors needs to be taken into account. This includes not only hydrological factors but social, economic and cultural effects. The links between these factors need to be specified and the way in which they impact on each other should be simulated

This type of approach is a long-term venture, but the Sri Lankan government has recognised that to ensure the sustainability of future dry season water resources participatory integrated management at the basin scale offers the best way forward.

Recommendation & Conclusion

(1) A catchment management committee Should be established comprising of relevant water authorities (Irrigation, drinking water, Administrative offices, NGOs, farmer organizations, Industries and Agriculture department etc. The committee should review monthly water issues, demand issues, quality issues and to take remedial action accordingly.

(2) Most settlers in highland areas located along water paths and they do not have proper sanitation facilities. Action should be taken to resettle them in away from the water paths and provide proper sanitation facilities.

(3) Paddy is the popular traditional crop type in the dry zone in Sri Lanka which consume more water than the other crop types such as vegetable, fruits, grains etc.On the other hand ,most of the farmers have attitude on flood irrigation in their paddy field to obtain bumper harvest but in the reality as not do so. Introducing water saving techniques, changing attitudes & anchorage on other multi seasonal crops would give advantages on integrated water management during the dry period.

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Table 1. Menik ganga river basin - drinking water demand forecast (year 2025)

River Basin	Year 2025 Demand (MCM)					Overall Total (MCM)	Water Allocation (MCM)				
	Monaragala District				Other District		Urban Centers		Village Centers		
	Demand Centers (No of GN Division)	Demand at Urban Centers	Demand at Village Centers	Total			Surface water 90%	Ground Water 10%	Surface 40%	Ground Water 35%	Rain Water 25%
Menik Ganga	21	6.06	5.35	11.41	4.25	15.66	7.48	0.82	2.94	2.57	1.84

Table 2. Assessment of surface run off and annual water budget along the Menik ganga river basin (year 2025 design horizon)

Name of River Basin	Catchment Area sq.Km	Average Annual Rainfall (mm)	Run off factor	Run off (MCM)	Annual water Usage (MCM)							Net Water Balance (MCM)
					Irrigation	Drinking Water		Industrial	Other	Base Flow Reservoirs	Total	
						Urban Centers	Village Centers					
Menik ganga	1272	1429	0.164	298	70	7.48	2.94	1.8	4.6	1.08	87.9	210.1

- Assumed that the present Irrigation demand will increase by 20% at year 2025 design horizon.

Table 3. Dry flow water balance (year 2025 design horizons)Menik ganga river basin (catchment area 1272 sq.km)

Month	Monthly Rainfall (mm)	Runoff Coefficient 0.164	Runoff (MCM)	Water Requirement (Major) (MCM)						Total (MCM)	Surplus/Deficit (MCM)
				Drinking		Irrigation	Industrial	Others	Base Flow Allocation		
				Urban Centers	Village Centers						
June	23	0.164	4.80	0.62	0.25	8.75	0.15	0.44	0.09	10.3	-5.50
July	21	0.164	4.38	0.62	0.25	8.75	0.15	0.44	0.09	10.3	-5.92
August	21	0.164	4.38	0.62	0.25	8.75	0.15	0.44	0.09	10.3	-5.92