Restraining conflicts through institutional interventions: The case of Mahaweli, Sri Lanka.

ERN Gunawardena[1] and KN Wickramaratne[2]

1/ South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERs), Hyderabad, India
2/ Mahaweli Auhority of Sri Lanka, Digana, Sri Lanka

Introduction

Sri Lanka receives rain mainly through two monsoons; northeast monsoon (*Maha*)and southwest (*Yala*) monsoon. The *Wetzone* occupies south western part of the country and receives rainfall from both monsoons and, thus more suitable for plantation crops. The *Dryzone*, which constitute the balance 2/3rd of Sri Lanka receives rain only from northeast monsoon, hence requires supplementary irrigation to cultivate both *Maha* and *Yala* seasons. The flat terrain, higher solar radiation and fertile soil make *Dryzone* ideal for irrigated paddy, the staple food of Sri Lankan.

Therefore, irrigated agriculture was developed as far back as 2500 years ago in the *Dryzone* of the country. The historians characterize this early Sri Lankan society as a "hydraulic civilization" (Leach, 1959). The invention of *bisokotuwa* or Valve Pit, the counterpart of the sluice which regulates the flow of water from a modern reservoir tank, has made the construction of large dams possible in 3rd Century AD. River diversion work through the construction of weirs across the longest river in Sri Lanka, Mahaweli was carried out in 495 AD to augment the larger reservoirs build in the *Dryzone*. Ever since, constructions of reservoirs and augmentation from river diversions have continued with the thriving civilization in the *Dryzone*.

There was a greater socio-ecomonic change after the colonial rule in 1818. Forests in the headwaters of the *Wetzone* were cleared for plantation crops and the irrigated agriculture was neglected at least till mid 1980s (De Silva, 2005). Foreign exchange was earned by exporting tea and rice was imported. However, irrigation policy was changed in mid 1880s with an attempt to revive the ancient network of irrigation channels and tanks in the *Dryzone*. A new agricultural policy came in to effect with the appointment of a Sri Lankan as the first Minister of Agriculture of Lands in the colonial government in 1930, who subsequently became the first Prime Minster of Sri Lanka. In this new policy, irrigation was the predominant element, and its objectives were tow fold, namely to increase paddy production of country and to enable more people to settle on the lands in the *Dryzone*. Its purpose was to reduce unemployment and lessen the pressure of the population in the *Wetzone* (Manchanayake and Madduma Bandara, 1999). During this period, he started number of colonization schemes by restoring ancient irrigation works, such as Minneriya, Minipe, Elahera, Kalawewa, Allai-Kantale, Parakrama Samudra and Padawiya. He was instrumental in constructing the first multipurpose reservoir in Sri Lanka, Senanayaka Samudraya of 950 MCM capacity irrigating 48000 ha in the Gall Oya

valley and its settlements. It is also appropriate to mention that this multipurpose project was undertaken without any donor assistance. Successive governments after independence have heavily invested on expanding irrigated agriculture in the *Dryzone* to achieve self sufficiency in staple food, rice, as well as other subsidiary crops. A large number of irrigation schemes were either rehabilitated or newly developed after the independence until the biggest ever investment was made in implementing the Mahaweli Ganga Development Project (MGDP).

Mahaweli Ganga Development Project

In 1951, the Government of Sri Lanka had obtained assistance from the government of Canada , under the Colombo Plan Programme, to undertake a survey by aerial photography to evaluate and prepare an inventory of the land and water resources of the country including the Mahaweli basin. The inventory identified potentialities for the development of 425 MW of hydropower and irrigation of 270,000 ha of land.

To implement the project, the first feasibility study for Mahaweli Development was carried out under an agreement with the United State Operation Mission (presently USAID) during the period from 1958 to 1961, jointly with the irrigation Department (ID). The recommendations were then presented to the Parliament in 1962. There was a strong objection to this proposal based on the fact that this diversion as a part Mahaweli from its upper reaches near Kandy to adjacent dry zone in the North Central Province had done without studying the overall potential for development of the entire land and water resources in the Mahaweli, particularly in its own basin lower down (Cooke, 2003).

The Parliament did not approve the USAID recommendation and requested the UNDP to undertake an independent comprehensive study. The Government of Sri Lanka has signed an agreement with the UNDP/FAO in 1963 to prepare a master plan to develop the Mahaweli basin, which has the largest potential for both hydropower generation and irrigated agriculture in the *Dryzone*. The master plan which was completed in 1969 proposed the development of Mahaweli basin in 3 phases over a period of 30 years (Cooke, 2003). This master plan envisaged the development of 350,000 ha of land, including 97,000 ha existing irrigable lands, in Mahaweli and 6 allied basins, as shown in Figure 1, and install hydropower capacity of about 600 MW.

The MGDP originally planned for the implementation over a 30-year period was commenced in 1970 with the World Bank Assistance. The MGDP was brought to acceleration in 1979, as a major political decision of the government which came to power in 1977 with an unprecedented majority. Many friendly donor countries offered financial assistance to the new government to pull it out of its economic difficulties. Stable government with $5/6^{th}$ majority in the Parliament along with the open market policies, the first country to introduced such policies in South Asia, may have prompted the donors to help Sri Lanka with this largest investment ever made in its history. By accelerating the MGDP, the government expected to solve many issues including unemployment, food shortage and energy crisis. For example, the official unemployment figure stood at 2 million in 1977 with an annual increment to the workforce of about

125,000. At this time, 1/3 of the annual budget was spent on importing essential food items. The demand for electricity has increased from 6% in 1977 to 15% in 1978 in the rapidly expanding commercial and industrial sector, such as those in the Free Trade Zone, due to the government policy to liberalize the economy.

In order to harness the resources that were required for the MGDP, a "Sri Lanka Aid Group" was formed in Paris in 1978 and the World Bank coordinated its activities. The financial assistance to complete the major headwork and down stream area development came from, UK, Sweden, Canada, Germany, USA, Australia, Netherlands, Japan, Kuwait, China, World Bank, ADB, OPEC, European Economic Community and UN Agencies (Cooke, 2003).

A strong organization called Mahaweli Authority of Sri Lanka (MASL) was created to implement the MGDP through Mahaweli Authority Act No 23 of 1979. This act has wide range of powers to ensure that the MGDP is implemented without any hindrance. For example, existing irrigable lands, minor tanks and forests were acquired and incorporated them in designing a new irrigation infrastructure. Two agencies namely Mahaweli Engineering and Construction Agency (MECA) and Mahaweli Economic Agency (MEA) were created under MASL. The MECA was responsible for down stream development which included planning, designing and construction of irrigation and social infrastructure. The MEA was responsible for, a) integrated development and management of the downstream areas of the Mahaweli involving settlements of farm families and provision of agricultural and social services for socio-economic upliftment of the community and, b) operation and maintenance of upstream settlements areas of reservoirs built under the MGDP.

With the completion of the MGDP in mid 1980s, emphasis was shifted from construction activities to operation and maintenance of the system.

Potential conflicts

Conflicts occur when demand exceeds supply. Irrigated agriculture and hydroelectric power generation are the two main sectors which uses the Mahaweli water. One of the major constructions of the MGDP was the Polgolla barrage and associated tunnel to divert water to the ancient reservoirs in the north central part of the country (Figure 2). A total of 90,000 ha of water-short land received water through this diversion. Three reservoirs, namely Victoria, Randenigala and Rantembe, were constructed across the natural path of the Mahaweli which flows towards east, predominantly for power generation. The installed capacity of power plants of the eastern reservoir cascade is more than 10 times that of the plants along the north central path. Although the use of Mahaweli water for irrigation and hydropower generation are to a large extent compatible, conflicts do arise, particularly over the quantity to be diverted at Polgolla away from the path of maximum generation head. Sending water along the eastern cascade to generate more power is a financially attractive proposition though north central province is more densely populated, consists of large number of ancient irrigated infrastructure and is also politically more powerful. At the stage of drawing the master plan, 1270 MCM was

allocated as diversion to the north central province from Polgolla. However, in practice this quantity has been reduced to 69% during last few years resulting 150% cropping intensity. In contrast, irrigated lands in the eastern cascade receive more than adequate amount of water and hence enjoy 200% cropping intensity. Allocating water in an equitable and fair manner among large number of tanks in the water-short north central province, as shown in Figure 2, has also become a problem since demand is always tends to be higher than the supply. Inadequate water at the system level continued to create conflicts among farmers when they try to share water. Therefore, conflicts arise at national level between sectors, such as irrigation and hydropower and local level between farmers in individual irrigation schemes.

In water allocation, priority is given to domestic uses, which is a small fraction of irrigation issue at present and can easily be met. However, there are dry spells, which require water releases and diversions from reservoirs to meet the domestic needs. Conflicts generated due to transferring water out of traditional irrigation reservoirs for domestic purpose can some time end up in courts as in the case of Thuruwila (Athukorala, 2006).

Institutional arrangement at national level

Anticipating conflicts as mentioned above, it became necessary to create a mechanism to manage the water resources of the MGDP. It was sensible planning at the initial stage to anticipate issues related to water allocation between sectors and users in view of growing demands in agricultural and industrial development after the completion of MGDP. To address this need of water allocation, management and monitoring, the Water Management Panel (WMP) was established in 1985 at the head office of MASL. The WMP is headed by the Director General of MASL and consists of all Heads of Government Agencies concerned with the management and operation of the MGDP as shown in Table 1. They consists of a)Director General of Irrigation Department, b)Director General of Department of Agriculture c)Chairman of Ceylon Electricity Board and d)Government Agents/District Secretaries of respective districts within Mahaweli and 6 allied basins.

The WMP is assisted in its works by a technically specialized Water Management Secretariat (WMS) constituted within the MASL. The WMS provides information and recommendations to the WMP to assist it in reaching its operational policy decisions. Once the decisions are made, the monitoring of the total programme is directed by the WMS. The Director of WMS functions as the secretary to the WMP.

The WMS uses a multipurpose, multi-reservoir computer model ARSP (Acres Reservoir Simulation Programme developed by ACRES International Ltd) to plan water allocation. This model uses data on hydrology, crop and irrigation water requirement, energy generation, systems status and diversion capacity of structures and maintenance programme of power plants and other structures. At the beginning of each season WMS prepares a System Operation Plan (SOP) for the cultivation season which gives operation

policy, allocation/distribution priorities and programme for the season for Mahaweli and other allied basins (Abeygunawardena and Imbulana, 2005).

Each Mahaweli system has a Residential Project Manager (RPM) who is an administrative head of the system. He is supported principally by two Deputy Residential Project Managers (DRPM), one for irrigation and one for agriculture. Each system is divided to blocks and units and managed by Block Managers and Unit Managers respectively.

In addition to the MASL, which is the major user of water, there are number of other institutions involved in managing water at national and local level as shown in Table 1. These organizations are independent and operate under different ministries. However, all these organizations in one way or another has to be involved in decision making process in water allocation since they all operate within the Mahaweli area identified under the Mahaweli Authority Act No 23 of 1979 as shown in Figure 1.

Institutional arrangement at system level

There had been a very sound irrigation management system in ancient Sri Lanka with the participation of communities, especially in the management of irrigated infrastructure. During the early period of British rule, the Colonial Government was preoccupied with military and political consideration and thereafter in the development of plantations in the *Wetzone*. In addition, the scorched-earth tactics adopted by the Colonial Government during the Great Rebellion of 1817-18 destroyed the irrigation complexes in Uva, then a prosperous region of the old Kandyan kingdom. The abolition of "*Rakakariya"* had its destructive aspect for it involved the sudden demolition of the traditional communal machinery which had kept the village irrigation facilities and the major tanks that were still in use functioning and in a state of repair (De Silva, 2005). This traditional system was revived to some degree in a different form with introduction of Paddy Land Act of 1958 that vested the power of management of minor systems with the Government Agent who could appoint '*vel vidanes*' in consultation with farmers to maintain and operate systems. This system too was abolished with time especially when central agencies took over this function in 1970s (Samarasinghe and Sumanasekera, 2005).

As an alternative to agency managed systems, the participatory and integrated approaches to irrigation management were experimented in major irrigation systems in Sri Lanka commencing from late 1970s. This intervention was made to ascertain as to how best the participation of beneficiaries can be obtained in management of irrigation systems such as the famous Gal Oya study (Uphoff and Wijerathna, 2000). However, these innovations could not be sustained due to the absence of an agency and a working arrangement to support these programmes after the project interventions were over. In addition, there were isolated interventions like Minipe and Kimbulwana Oya where the participatory approach was attempted to make improvement of water management by individual officials of the ID but these interventions died down with the departure of the interested persons.

Therefore, the then Ministry of Lands and Land Development which was in charge of subject of management of major irrigation systems, established the Irrigation Management Division in 1984 to implement the "Integrated Management of Irrigated Agricultural Settlement (INMAS) in 35 major irrigation scheme commanding about 157,000 ha out of total area of about 250,000 ha under the preview of ID ((Samarasinghe and Sumanasekera, 2005). Under this programme separate professionals were employed at schemes level to organize farmers to form Field Canal Group at the lowest level of hierarchy of the canal system as informal groups and Farmer Organizations (FOs) at Distributory Canal level as formal organizations. In addition, it formed a Project Management Committee (PMC) at scheme levels encompassing the farmer representatives elected by farmer organizations and agency officials involved in management of irrigation at scheme level. After having observed its success the ID and MASL adopted similar models for participatory management in major irrigation systems and Mahaweli systems not covered by the INMAS. These programmes were implemented without legal recognition until the Agrarian Services Act was amended to recognize FOs in 1990 and the Irrigation Ordinance was amended to recognize PMCs and appointment of Project Managers in 1994. In 1989 the ID agreed in principle to hand over the management of the system below the Distributory Canals to FOs formally and agreed on a cost sharing mechanism with FOs after the Government of Sri Lanka accepted the 'Joint Management' as a policy. The MASL also adopted a similar strategy on transfer of irrigation management of downstream areas with no cost sharing basis.

Though, there were mix results over the years commencing from Gal Oya experiments, farmer organizations matured with time through interventions of various projects to strengthen them. Though, Gal Oya was initially identified as a not so successful intervention, later evaluations proved otherwise as reported by Uphoff and Wijerathna (2000); "*farmer organizations were established in the Gal Oya irrigation scheme in the early 1980's, which produced measurable improvements in system performance and efficiency. In the 1997 dry season, after farmer were told that there was not water in the reservoir to grow rice crop, they achieved through organization a better than average harvest from 65000 acres by efficient and equitable distribution. Ethnic cooperation was demonstrated by upstream sinhala farmers sharing water with downstream Tamil farmers*."

Mahaweli System H, being the first downstream area developed under the MGDP, had a luxury of continuous interventions by various donors to strengthen farmer organizations Therefore, it was relatively easy for the MASL to go a step forward in System H after the rehabilitation programme funded by the World Bank in 2002 to introduce bulk water allocation concept to farmer organizations for self management. This programme resulted in development of a demand driven water supply system within the area managed by the community as against supply driven system that exist elsewhere in the Mahaweli system.

Table 1. Major Agencies Involved in Water Resources Management
(*adopted from Birch and Muthukuda, 2000*)

Agency Responsible for Water Resources Management	Major Water Related function
Mahaweli Authority of Sri Lanka (MASL)	Responsible for water resource allocation among g irrigation and hydropower uses. Follow participatory approaches for decision making and real-time management of water resources in Mahaweli areas. Responsible for planning, construction and operation and maintenance of multi-purpose reservoirs, canals headworks and other structures, and for dam safety. Promotion of soil conservation measures and watershed management: monitor sedimentation levels in the reservoirs; provide extension services for irrigated agriculture in command areas.
Irrigation Department (ID)	Operates the national level hydrology data system covering 18 rivers. Responsible for planning, construction and operation and maintenance of irrigation, drainage and flood control and drainage infrastructure. Also responsible for implementation of seasonal planning for major and medium irrigation schemes outside areas declared under the MASL Act. It is also responsible for flood forecasting and control and implementation drainage and salinity exclusion in irrigation related projects.
Irrigation Management Division (IMD)	Promoting irrigation management through Project Management Committee (PMC) at irrigation system level by means of a co-ordination mechanism with all agencies responsible for irrigated agriculture in 37 major irrigation schemes. Strengthening participatory management of irrigation schemes by promoting formation of farmer organizations and farmer companies and training facilities
National Water Supply and Drainage Board (NWSDB)	Responsible for large development projects and system operation and maintenance in the provision of water supply for domestic an industrial uses. Coordinate rural water supply projects with the involvements of CBOs and local authorities
Ceylon Electricity Board (CEB)	Responsible for hydro-power generation, hydro and thermal mix up; long-term least cost generation planning and development and maintaining hydropower plants and related infrastructure
Department of Agriculture (DOA)	Involve in R & D and extension programme on water saving technology on variety of crops, implementation of agricultural policy, promotion of soil conservation and watershed management programmes
District and Divisional Secretaries	District Secretary: Coordination of “Kanna” meetings for irrigation water allocation. Implementation of irrigation ordinance. Coordination of District Coordinating Committee, District agricultural Committee and District Environmental Committee. Divisional Secretary: Coordination of Divisional Environmental Committee and Divisional Coordinating Committee

Water allocation process

It is important to describe the water distribution system and institutional setup at the project level before explaining the procedure followed in allocation of water. Water stored in a reservoir is released through two main canals, right and left bank canals from which branch canal originates. Water is delivered to a 1 ha farm plot of each farmer through branch, distributory and field canal. Each farmer receives water through an orifice from the field canal. As mentioned above all the farmers in a system has 1 ha each. For example, the total irrigation extent in Mahaweli System H is 31500 ha and is approximately equal to the number of farmers. This policy of allocating 1 ha land units per farmer has been adopted in all irrigation systems by the government of Sri Lanka unlike many parts of south Asia.

The water users associations, based on field canals are the lowest institutional units in Mahaweli systems. This unit is called field canal association or Turn Out Farmer Group (TOFG). Representative from TOFG forms under one Distributory canal forms in to a Distributory Canal Farmer Organization (DCFO). Block Level Farmer Federation (BLFF) consist of representatives from DCFOs are responsible for the preparation of cultivation plan, manage bulk water allocation and arrange forward contracts to facilitate marketing of products.

Water demand estimates starts from individual farmers in a field canal. The cropping pattern and associated water requirement of each farmer is consolidated at the field canal, distributory canal and given to BLFF. Aggregate requirement of BLFF produces the system requirement. The RPM of different Systems of the MGDP send this requirement to the WMS. A similar procedure is applied in irrigation systems within the MGDP managed by the ID and the bulk water requirement for the system level is provided to the WMS. The Ceylon Electricity Board provides information on plan availability and energy and peak power demand over the season. All these information are used by the WMS to prepare the Seasonal Operational Plan (SOP).

Platform for discussion and decision making

The SOP prepared by the WMS, taking into consideration of water demand and supply, is discussed at the Pre-Seasonal WMP meeting that will be held with the participation of all concerned agencies and ministry representatives and farmer representatives prior to beginning of each season and approved. Table 2 provides the information on representatives of relevant organizations, listed in Table 1, which met on 5th October 2006 in Kandy, Sri Lanka. The minutes of the meeting along with water allocation for each irrigation scheme is given in the website of MASL (*www.mahaweli.gov.lk*) and, therefore, known to all. The approved SOP gives details on projected reservoir releases, energy generation (both hydro and thermal), projected diversions, reservoir behavior, allocation of water for each irrigation scheme, projected reservoir storage at the end of each month, sluice issue and expected rainfall calculated under average and dry weather

conditions, for reservoirs and irrigation schemes connected with Mahaweli development, on monthly basis.

According to the minutes of the meeting, the Deputy Director of the WMS has briefed the members on water issues, water consumption and extent cultivated in each Mahaweli system. He also provided the comparison of seasonal water use value of 2006 *Yala* with average 10 years values to make a point that water use efficiency in 2006 *Yala* season has increased. This was followed by a presentation on likely rainfall by the Director General of Irrigation Department. The third presentation by the Secretary to the WMP described the SOP prepared for the forthcoming cultivation (*Maha* 2006/07) season based on the output from the computer. This was followed by submissions from the representatives of each system. Since there was adequate water available, no changes were made to the water allocations or extent to be cultivated. However, farmers were able to persuade the Pre-Seasonal WMP to either advance the date of water releases for cultivation (since adequate water is available in the reservoir) or delay the water releases (until maintenance work is over in canal system). Common issues related to farming community, such as procuring input and marketing of products, were also discussed since relevant government officials were present at the meeting.

Once allocations are made to different system at the national level, Officials along with the BLFF allocate bulk water requirements to each DCFO. BLFF are requested to adjust cultivation plan if there is a shortage of water.

Real time water transfer management

Due to uncertainties associated with hydrological forecasting on which the operation plan is based and the complex nature of the distribution system, there will be deviations from the SOP while implementing water distribution. Hence the operation plan has to be continuously reviewed and revised to suit the actual conditions.

WMS has reasonably good feed back arrangements as they have weekly meetings with the officers of CEB, Irrigation Department, Water supply and drainage board and MASL. RPM of Mahaweli systems send details of water issues weekly on daily basis to WMS while Irrigation Engineers provide those details on monthly basis to WMS. Details of power generation, both hydro and thermal, are also obtained from CEB on weekly intervals. WMS prepares a detail monthly report within first two weeks of the following month. In these monitoring meetings any disputes that arise due to different interests in competing water users ate discussed in detail to arrive at solutions acceptable to all parties concerned. If the deviations from the SOP were found to be very significant during implementation, it would be updated with actual system status at that time. WMS has developed operating rules for reservoirs or “rule curves” to maximize the total benefits. In planning weekly operations the rule curves are used as a guide though they can not be strictly adhered to. Rule curves divide the reservoir in to zones in which different operating policies apply.

Table 2. Institutional affiliation of participants at the Pre-Seasonal Water Management Panel Meeting held on 5th October 2006 to decide water allocation for 2006/2007 *maha* season

(*This table is prepared from the minutes of the meeting downloaded from www.mahaweli.gov.lk/Divisions/WMS/Weekly%20operational%20Meeting.pdf*)

Title/position	**Number**	**Institutional Affiliation**
Additional Secretary	01	Ministry of Mahaweli, Agriculture & Irrigation
Media Advisor	01	
Secretary	01	Ministry of Agriculture
Director General	01	Mahaweli Authority of Sri Lanka (MASL), Head Office in Colombo
Executive Director	02	
Director	03	
Act. Director/Agriculture	01	
Director (WM)	01	
Director (WMS)	01	
Computer Manager (WMS)	01	
Director (Headworks O&M)	01	Headwork Office, MASL, Digana and Kotmale
Director (Env. & Forestry)	01	
Engineer (Mech & Eng)	03	
Residential Project Manager (RPM)	19	Mahaweli Systems H, G, G, B, Huruluwewa, Medirigiriya etc)
Deputy Residential Project Managers (DRPM)	04	
Deputy Director	01	
Marketing Director	01	
Asst. Engineer	01	
Civil Engineer	04	
Director General (Irrigation)	01	Irrigation Department (ID) Head Office in Colombo
Directors	02	
Chief Engineer	01	
Director	01	Irrigation Management Division (IMD)
Human Resource Officer	01	
Zonal Directors/Irrigation	04	Provincial Departments of Irrigation (PID)
Provincial Irrigation Engineer	11	
Addl. Director (Nat. Resources)	01	Department of Agriculture (DOA)
Deputy Director (Seeds and Plant)	01	
Chief Engineer	01	Ceylon Electricity Board (CEB)
Electrical Engineer	01	
Chief supply Officer	01	National Water Supply and Drainage Board (NWSDB)
Government Agent	03	Government administrative machinery at District level
Divisional Secretary	09	
Land Officer	01	
Chairman of Farmer Organization	16	Farmer Origination representatives from Different Mahaweli Systems
Secretary of Farmer Organization	07	
Treasurer of Farmer Organization	01	
Total	111	

Conflicts

Though, the preceding sections describe the inclusiveness of all the stakeholders in, a) determining the water requirement, b) take part in decision making (at least legitimizing the decisions taken), and c) get involved in operationalizing the decisions taken, conflicts do arise. The following sections describe the various conflicts and possible conflict resolutions mechanisms adopted.

a) Conflicts at national level

There are problems due to operational reasons between power generation and irrigation. For example, release of water due to hydropower generation requirement during off season when the canals and structures under maintenance leads to problems between organizations. In some instances, water releases are too much for irrigation when hydropower is generated at full capacity.

There are issues related to the restriction of system designs. Limitation on capacities of Bowatenna Tunnel and Kandalama-Huruluwewa canal are constraints in diverting water to system H and MH. In addition, large scale illegal water abstraction along the Kandalama-Huruluwewa canal is a major problem faced by the farmers in Huruluwewa system.

At present number of irrigation reservoirs supply domestic requirements of towns and villages at the expense of irrigation, which at the moment is not large. But in future demand for domestic water supply would grow rapidly and conflicts may occur as there is no proper policy at present.

The WMP still provide a platform to bring these issues for discussions and decisions are made, though such decision may not be satisfactory to all the parties concerned.

b) Conflicts at system level

Non adherence to the approved SOP by the farmers by cultivating more extents, especially during *Yala* season, delayed cultivation and over use of water are the common problems. However, these problems are being taken care of at system level through the intervention of farmer organizations since numbers of such farmers are minimal.
The most common conflicts in Mahaweli systems occur specially during the unexpected drought years when what is delivered at the system level is less than the allocated amount. There are different coping mechanisms adopted by the local population. *Bethma* system has been practiced from ancient times when there is a water shortage where only a portion of the irrigable extent is cultivated (Goonasekere and Gamage, 1999). Change of cropping pattern from high water demanding crops to less water demanding crop is a another method. Extending irrigation interval in agreement with fellow farmers and Mahaweli officials is also very common.

During very difficult situations, farmers seek solace in religious activities since the entire community is affected. The religious leader in the village organizes chanting of “pirith” or practice “fasting” expecting rain to come. In most instances, rain do come after some time, perhaps, as a natural phenomenon, but the collective action of the community helps them to go through this difficult period together. Rather than encouraging conflicts due to limited resources, sharing the burden together is a common practice that is prevalent in rural Sri Lanka.

c) Conflicts at the local level

From the preceding sections it was apparent that conflicts, both at national and system level could be contained due to the strong intuitional arrangements at both levels. However, there may be additional conflicts in between at the local administrative level when water has to be diverted within the administrative boundaries at the district level.

The District Coordinating Committee (DCC) is the main administrative mechanism that coordinates activities at the provincial/district level, which consist of all local members of Parliament, Provincial Council, Pradeshiya Sabhas, Municipal councils and urban councils in the district and all administrative officers, Heads of Departments of Provincial Councils and regional/district officers representing line agencies (Officials from ID, MASL, NWSDB included). It is chaired by the senior Member of Parliment or the Cabinet Minister or Deputy Minister representing the district, and is co-chaired by the Chief Minister of the Provincial Council. The District Secretary (Government Administrative Officer) serves as the Secretary to the DCC. Though District Secretaries participate for the national level WMP meetings and Pre-seasonal WMP meetings, conflicts can occur when water is diverted between reservoirs and water issues are being made at the reservoirs to the system. There is a tendency to get political interference in such situations. However, this political interference has been not been able to significantly disrupt the water management activities in the MGDP. The strong institutional setup at national level and farmer organizations at system level, perhaps, lead to the inability of the politicians to constantly interfere with the change of these allocations at local level. In addition, politicians keep on changing during elections at regular intervals. Some also may do not want to get involved in these difficult issues of water management and hand over the responsibilities to bureaucrats to resolve the issues as a convenience.

In order to strengthen this “loose” arrangements at the local level, a pilot project was initiated under the World Bank funded ‘Mahaweli restructuring and rehabilitation Project” to form a River Basin Committee of Kala Oya basin within which System H, where bulk water allocation is introduced, is located. A former RPM was appointed as a Basin Manager. The Kala Oya basin is 2870 sq.km and falls in four administrative districts. Though the RBC was able to prepare a basin plan through consultations water sub-sectoral line agencies, water users associations and NGOs, it was not implemented due to lack of coordination between implementing agencies (Bandara, 2006). Reluctance of local administrative authorities to share power in order to strengthen a new institution at the river basin level was quoted as one of the reasons for failure. This also highlight the

fact that prescriptive institutions, such as ‘River Basin Committees’ promoted globally can not just introduced when there are organizational arrangements of similar nature exists, for example DCC in the Mahaweli case. Strengthening of such organization with an additional mandate is a much better options rather than introducing preconceived institution.

Lessons learned

Though there were many perceptions about the MGDP, it has contributed significantly to the development of Sri Lanka. The investment made on the project has already recovered through the generation of hydropower. Lands in the catchments areas and along the flood plain have been earmarked and protected through legislations and required institutional support. Sri Lanka has become self sufficient in paddy in late 1990s. Mahaweli also came to rescue during "Thuruwila” water conflict (Athukorala, 2006), where water was diverted for domestic purpose from a traditional irrigation tank, by agreeing to release more water to the said tank

However water quality has recently become a major issue threatening the sustainability of the project. On one hand demand for water is steadily rising while deteriorating water quality tends to aggravate the situation. Therefore, it is important to strengthen the institutional arrangements further in order to get other relevant sectors, such as environmental, industry and health to address these new issues of high water demand and deteriorating water quality problems.

The lessons leaned from the MGDP programme during its two decades of operation is given below.

1. The political will at the highest level coupled with strong legislation (Mahaweli Authority Act is one of the strongest Acts which overrides many other legislations in Sri Lanka) and resource allocation (Highest investment made in history of Sri Lanka for a single project when it was implemented) has succeeded in implantation of the MGDP. Setting up of WMP and operationalizing it, especially at the earlier stages where president himself chaired the meeting has helped to avoid conflicts between irrigation and hydropower sectors. This is very much similar to the Tennessy valley Project where political will, strong legislation and resource allocation were made to make it successful.
2. The inclusiveness of all these stakeholders in planning, allocation and operationalzing the decision taken has avoided conflicts, which otherwise would have been insurmountable. The robustness of this institutional mechanism and the transparent process followed in water allocation and its acceptance among the water users has basically prevented the entry of other extraneous factors, such as political interventions at substantive level, into the decision making and implementation process. The institutional arrangements for water allocation in Mahaweli has been in operation during last two decades and survived during various political regimes. Attempts have been made by donors (World Bank) to strengthen this institutional arrangement further so that MASL will later transform

itself in to a River Basin Authority so that water in all the river basins in Sri Lanka also will be managed as presently being done through the exiting mechanism at the MASL through WMP.

3. There are different platforms to iron out problems before such issues lead in to conflicts. WMP at the head office in MASL is available to resolve issues between different organizations at national level. Pre-Seasonal WMP meeting at national level provide forum to discuss and agree water allocation at system level.
4. Strong organizational arrangement linking national to system level has helped to plan, implement and monitor water allocation and use. Political and dministrative interference can be minimized once there is a time-tested accepted method for water allocation and monitoring.
5. Strong farmer organizations at system level are mandatory to help to resolve water management issues at the local level. Consistent intervention in farmer training over three decades, supported by introducing various policies and legislation at regular intervals, whenever such measures are required, resulted stronger farmer organizations to manage the water at system level.
6. The culture and tradition associated with strong religious background of farming community helps to go through difficult period together rather than engaging in conflicts when water available is less than the allocated amount due to vagaries of nature.

Creating ‘apex organization’ at national level to plan ‘water resources development and management’ considering ‘river basin as a planning unit’ and introducing policy and legislation to create an enabling environment through stake holder participation to avoid conflicts are some of the recommendations promoted globally under “Integrated Water Resources Management. In this respect, Sri Lanka has already made some headway towards achieving that vision through the MGDP.

References

Abeygunawardena, M.H. and K.A.U.S.Imbulana, 2005. Inter/Intra basin water transfers and management in Mahaweli systems. In Proceedings of consultation on river basin management. Lanka Jalani, International Irrigation Management Institute, Colombo. 43-58.

Athukorala, Kusum, 2006. Water transfer out of agriculture: Towards a win-win solution? A case study of Thuriwila. In: Intergrated Water Resources Management (Ed: Peter P Mollinga, Ayaja Dixita dn Kusum Athukorala), Sage Publications. 317-351.

Birch, A and P.Muthukude, 2000. Institutional Development and capacity building for integrated water resources management, Water Resources Council and Secretariat, Colombo, Sri Lanka. 89 p.

De Silva, K.M. 2500. A history of Sri Lanka. Penguin books. 378-392.

Cooke, R.S. 2003. The Mahaweli Ganga development programme. In: Water for People and Nature: Arumugam Commemoration Volume. Ministry of Irrigation and Water Management, Colombo, Sri Lanka. 17-48.

Goonasekere, Kapila and Henry Gamage. 1999. Some indigenous technology knowledge and practices for watershed management in Sri Lanka. Ed: by Prem N Sharma. Asian WATMANET-PWMTA, Participatory watershed management training in Asia (PWMTA) Programme, GCP/RAS/161/NET, FAO(UN), UN House P.O.Box 25, Kathmandu, Nepal. 63 p.

http://www.mahaweli.gov.lk

Leach, E.R. 1959. Hydraulic Society in Ceylon. Past and Present, No 15

Manchanayaka, Palitha and Madduma Bandara, C.M. 1999. Water Resources of Sri Lanka. Natural Resources Series No 4. National Science Foundation, Sri Lanka. pp112.

Samarasinghe, S.A.P. and Sumanasekere, D.U. 2005. Community empowerment and management experiences in the water sector. In: Proceedings of consultation on river basin management. Lanka Jalani, International Irrigation Management Institute, Colombo. 31-42.

Uphoff, Norman and Wijerathna, C.M. 2000. Demonstrated benefit from social capital: The productivity of farmer organization in Gal Oya, Sri Lanka. World Development, 42 pages.

Figure . 1

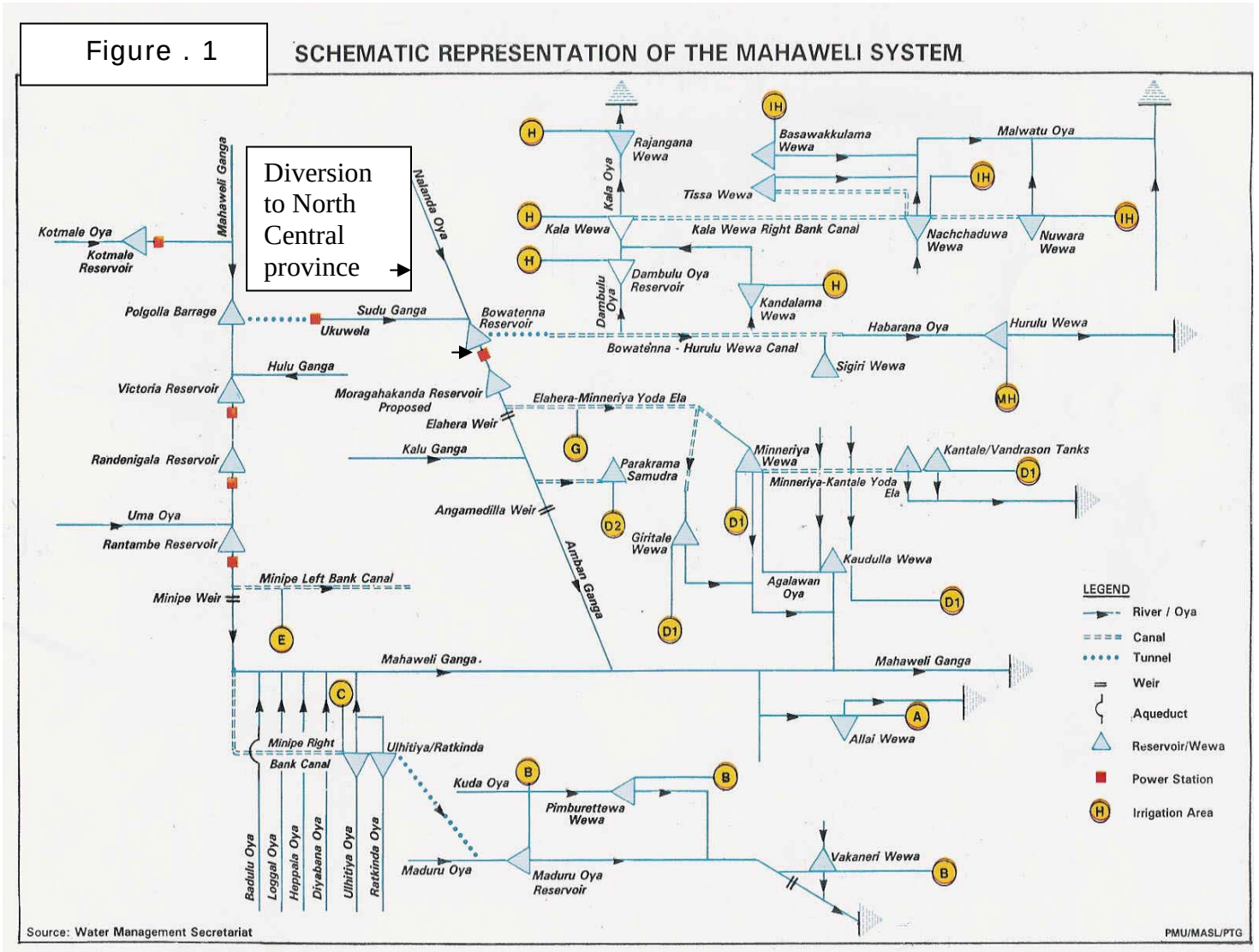
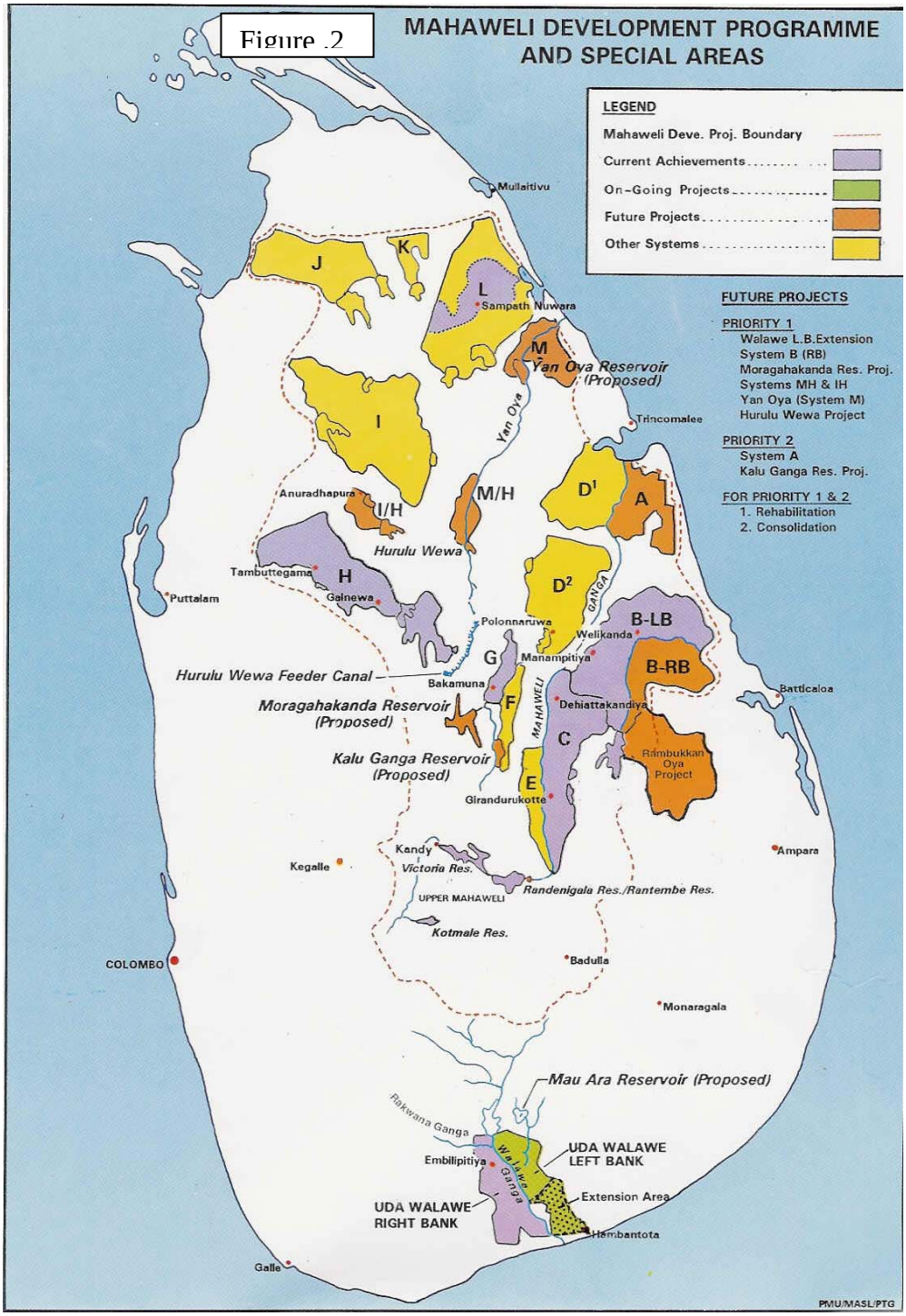

SCHEMATIC REPRESENTATION OF THE MAHAWELI SYSTEM
Diversion to North Central province
Mahaweli Ganga
Kotmale Oya
Kotmale Reservoir
Polgolla Barrage
Sudu Ganga
Ukuwela
Hulu Ganga
Victoria Reservoir
Randenigala Reservoir
Uma Oya
Rantambe Reservoir
Minipe Weir
Minipe Left Bank Canal
Minipe Right Bank Canal
Mahaweli Ganga
Nalanda Oya
Bowatenna Reservoir
Moragahakanda Reservoir Proposed
Elahera Weir
Kalu Ganga
Angamedilla Weir
Amban Ganga
Elahera-Minneriya Yoda Ela
Parakrama Samudra
Giritale Wewa
Minneriya Wewa
Minneriya-Kantale Yoda Ela
Kantale/Vandrason Tanks
Kaudulla Wewa
Agalawan Oya
Allai Wewa
Vakaneri Wewa
Rajangana Wewa
Kala Oya
Kala Wewa
Kala Wewa Right Bank Canal
Dambulu Oya
Dambulu Oya Reservoir
Kandalama Wewa
Basawakkulama Wewa
Tissa Wewa
Malwatu Oya
Nachchaduwa Wewa
Nuwara Wewa
Habarana Oya
Bowatenna - Hurulu Wewa Canal
Sigiri Wewa
Hurulu Wewa
Ulhitiya/Ratkinda
Kuda Oya
Pimburettewa Wewa
Maduru Oya
Maduru Oya Reservoir
Badulu Oya
Loggal Oya
Heppala Oya
Diyabana Oya
Ulhitiya Oya
Ratkinda Oya
LEGEND
River / Oya
Canal
Tunnel
Weir
Aqueduct
Reservoir/Wewa
Power Station
Irrigation Area
Source: Water Management Secretariat
PMU/MASL/PTG

Figure .2



Note: Udawalawe scheme in the south are being managed by MASL though it does not get water from Mahaweli