Basin Scale Drought Management in Kirindioya River System

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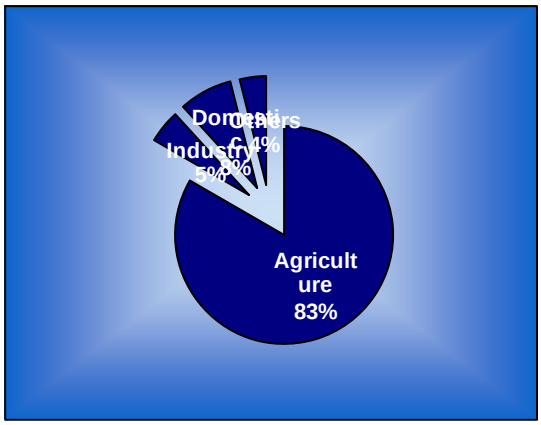
INTRODUCTION

Sri Lanka is one of the few countries in the world that has had a thriving and vibrant irrigation based civilization for over two thousand years. The cascade system, they used for cultivation of paddy, harmonized environment and development in an environmentally sound and sustainable manner. It is an island state with an extent of approximately 65610 square kms, situated in the center of the Indian Ocean. It has tropical climate and divided into two climatic zones, namely Wet and Dry Zone. Two monsoons bring rain to all parts of the country, and receives about 12 million hectare meters of water annually. The rainfall was very skewed, over 50 to 70 percent of the precipitation during the South West Monsoons was received in the month of April. It has been also observed that average temperature of the country has been rising annually at the rate of 0.01 – 0.03 *C due to the increase of both nighttime minimum and daytime maximum temperature regimes.

The demand for water in the country is on the increase in the crop production sector as well as others, especially the domestic water supply, industry, environment, fisheries and livestock, hydropower and wild life habitat etc. Such water requirement in the dry zone has to come from irrigation savings, which is used about 90 % of water withdrawals in dry zone. Long term predictions made by the IWMI says, some parts of the dry zone in Sri Lanka will face severe water shortages if the water use efficiency in irrigation is not doubled by year 2025.

Figure 1. WATER WITHDRAWALS IN SECTORS



Water Withdrawals By Sectors In Sri Lanka	
Agriculture	83 %
Domestic	6 %
Industry	5 %
Others	4 %

Although Sri Lanka does not face water resource management crisis, there are growing indications of stress in the water sector and competition among water users in the community based irrigation settlements, due to high variations in annual and monthly rainfall. The ADB working paper illustrates that Sri Lanka has the second highest

annual variability of rain fall of 22 Asian countries, high seasonal variability further complicate the water supply situation. The onset and withdrawals of monsoon vary from year to year making it difficult to predict reservoir inflow. Much of the rainfall is concentrated with in 3 to 4 months of a year, when a major part of the reservoir inflow takes place. The uncertainties involved in predicting the quantum and timing of these rainfall and flow events make seasonal planning of irrigation scheduling cumbersome.

THE KIRNDI OYA COMMUNITY BASED IRRIGATION SETTLEMENT PROJECT(KOISP)

This report, through a case study of the KOISP at Hambantota in Southern Sri Lanka, provides evidence of the uncertain and inadequate inflow in to the reservoir due to climatic variabilities and their impact on the seasonal planning to the agricultural production and to the economic development to the project in last fifteen years period.

The Kirindi River is 118 km long and fed by a catchments area of 1203 km., which has under gone a rapid transition since the reservoir started operation in 1986. Heavy migration of settlers to the upstream was reported. Demographic and land use changes with the clearing of forest cover in the upstream directly contributed to decline the annual flow in to the river and to the reservoir.

We observed that inflow to the reservoir has decline slowly, in 1992 received only 35 MCM against an average of 83 in the dry spell. The total value of rainfall is 342 mm against an average of 769 mm. It was reveled that 2end July 2002, the press reported that the International Federation of Red Cross had, launched a world wide appeal in Geneva for urgent relief to 400000 villagers in Hambantota suffering immense hardships from the two-year long drought. With the year long droughts and scarcity of water to manage irrigation, drinking water and sanitation services as well as the river flows required to protect the bio diversity, is a challenge to the communities, who managing the system under the water scare conditions to improve their scheduling of operational and production plans for the enhancement of food production in harmony with the watersheds and the ecosystems in sustainable way to feed the gradually expanding population.

COPING MECHANISM ADOPTED BY THE PMC

The coping mechanism adopted by the agency officials and communities, in alleviating the negative impact of the water stress situation was the both parties agreed decision making system and the higher management efforts done by the Project Management Committee (PMC)of the KOISP. Which is empowered by providing legal status amending the Irrigation Ordinance in 1992

The PMC is an interdisciplinary team of experts incorporating the engineers, agronomists, economists, sociologists and with experienced community members under the guidance of Project Manager aims to provide authorities and governmental institutions with appropriate methodologies to improve long term development plan in the project. The PMC is the top level joint committee, chaired by the Project Manager from the Irrigation Management Division is the legitimate decision making body for water resource management in the project.

PMC is the main decision making body, involving co-management of resources where responsibility and authority in respect of water shed and irrigation management are shared between the government and the stakeholders.

The food production, drinking water and sanitation and industry water supply and the river flows to required to protect bio diversity plans are based on the water left over in the reservoir at the beginning of the season. On calculation of the expected inflow to the tank, acquisition of weather data including rainfall and ET, the Irrigation Engineer proposes the planning schedule. Then the PMC discusses it at length to decide by prioritizing the allocation of drinking and sanitation water first and the cultivation and other development plans, (extent to be grown, start and end dates of water release etc.) Also, each month, the PMC meets and monitor the development plans. It is revealed that much consultation and communication between and among the communities and agency officials was necessary to get the full benefit of the community based water resources management.

FINDINGS -- **IMPROVING THE PRODUCTIVITY OF WATER AND WATER USE EFFICIENCY**

In the water stress situation, it is very important the cooperation of the communities and the CBO leaders. Especially in the paddy cultivation programme their willingness to get maximum use of effective rainfall by carrying out land preparation with using rain water and retaining tank water for crop maintenance and other uses is important. The study showed that the water duty reduced from 8.56 a.ft to 5.55 a.ft in 2004 dry season and by increasing the irrigation water productivity by 1 % to 6 %. Meanwhile on farm and system water saving irrigation practices, such as rotational water supply to channels was started with the consultation of the upper and down stream stakeholders by introducing -on and off- mode. It is reveled that wet and dry mode increased the yield. On and off method considerably reduced the return flows. Reuse of return /drainage flows through the net work of cross bunds and small tanks and diverted the drainage water to their fields by gravity and pumping and it reduced the burden of water scarcity.

OPERATION AND MAINTENANCE- INVESTMENT AND INCENTIVS

PMC Capacity Development Process, via soft path- training and awareness programs increased the stakeholder participatory rehabilitation activities. It is cost effective and easy to maintain and operate, i.e. in some cases allocation of government funds in budgets to the irrigation sector have reduced to 50 %.

To mitigate the drought and floods, 98% stakeholders renovated their own tanks, cascading the water flows for down tanks, and it improved the water storage capacity, helps to ease societies out of their vulnerability to changes in rainfall, under the Tank Rehabilitation Project.

IMPROVED WATER MANAGEMENT PRACTICES

The schemes are managing through active involvement of the local community as the main stakeholder groups, used their indigenous knowledge incorporated to improved water management, conservation and harvesting practices to get more “crop–per–drop”, enhancing water productivity in the schemes.

Figure 2 INVOLVEMENT OF LOCAL COMMUNITY

ONFARM AND SYSTEM WATER SAVING IRRIGATION PRACTICES

Such as rotational water supply in channels was introduced with the consultation of the upper and down stream stakeholders by using an “on and off mode”, and regular water auditing by the PMC reduced the return flows and increased the yields.

ALTERING CROPPING PRACTICES AND CROPPING INTENSITY

Project farmers were encouraged shift from paddy to less thirsty crops like Banana, Beans and Vegetable to get more income through less water than rice. This conserved water and improved soil fertility with the improved water management practices, the scheme’s Cropping Intensity have been increased from 150 to 175 %.

Graph -1

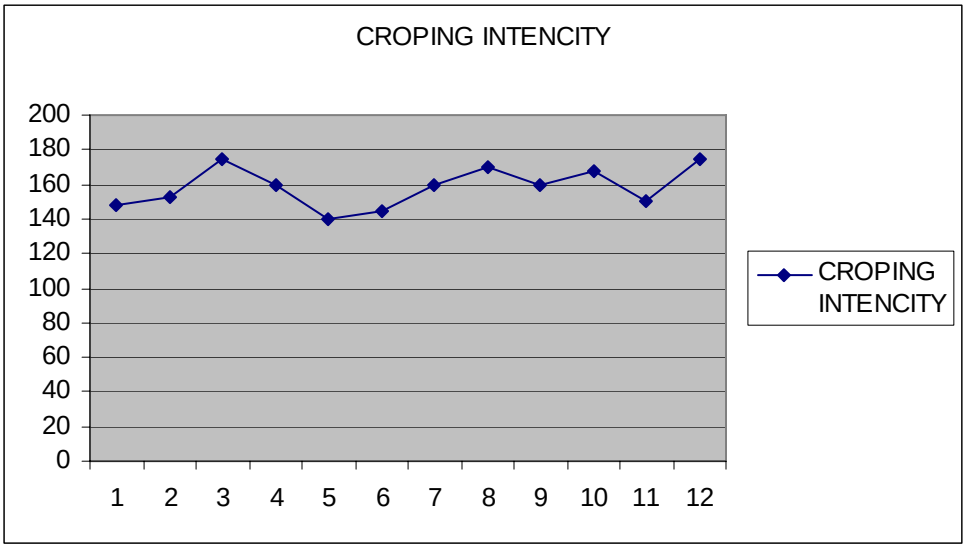
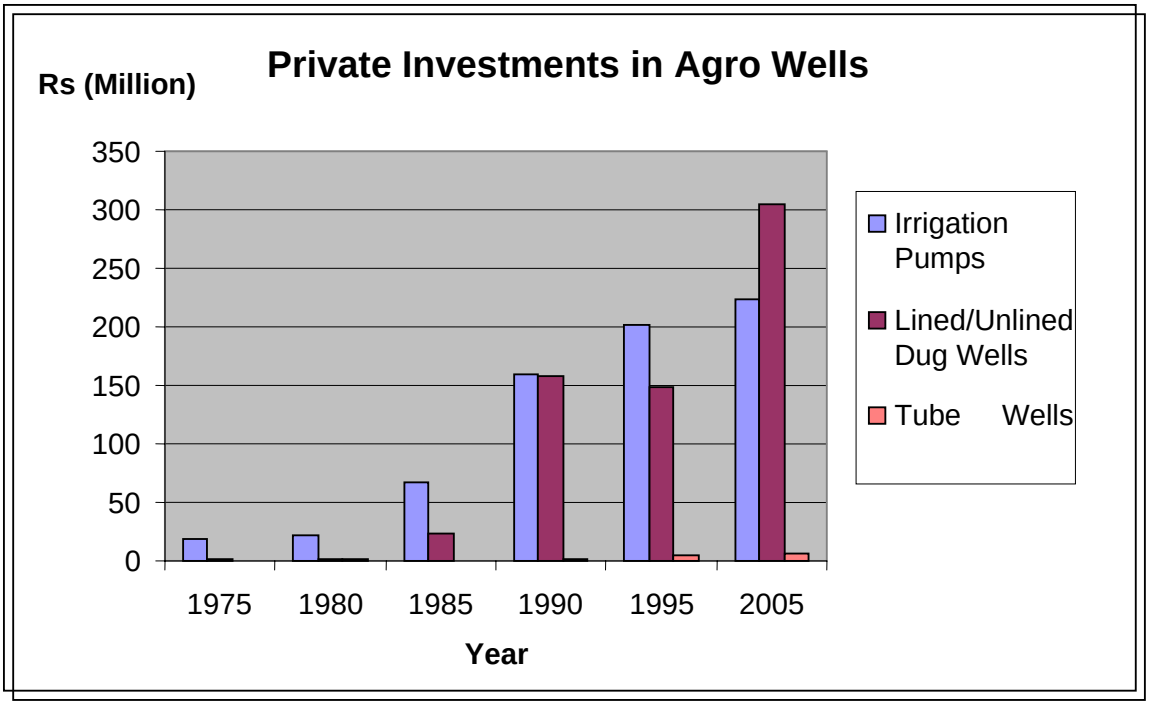


FIGURE 3- ALTERING CROPPING PRACTICES

DRINKING WATER AND SANITATION

Domestic water supply systems and sanitation services also better managed with the community participation. Most government support water supply schemes and sanitation programs are more supply driven rather than participatory or demand responsive. Hence there is much more failure in the water supply systems and sanitation facilities, again they also failed to encourage people's initiative, no attempt were made to integrate activities and to ensure sustainable maintenance and use of created assets. The KOISP Community Water Supply and Sanitation project, supported by the World Bank, is the resultant of major failure in these sectoral and supply driven models and adopted the holistic and demand responsive approach with the community participation, where the beneficiary community was supposed to contribute in the overall planning and implementation of program with 10 % cost sharing in the form of cash and kind of total water supply and around 40-60 % contribution in sanitation facilities with 100 % operation and maintenance, implemented through central Project Management Unit, working directly with the CBOs and the Local Authorities. This project provided water services to all the villages in the settlement with different water supply technologies- gravity, tube wells, dug wells, hand pumps, infiltration well and rain water harvesting.

Graph -2



RAIN WATER HARVESTING FOR DOMESTIC AND IRRIGATION

Rain Water Harvesting is an integral part of water resource management in the KOISP project by constructing small tanks, dams and ponds, as well rain water harvesting through rooftop and cement storage tanks have been introduced as a strategy for augmenting current drinking water supplies to keep pace with the increasing population..

Figure 4 RAIN WATER HARVESTING

POSITIVE MOTIVATIONAL CHANGES –KNOWLEDGE TRANSFER

Training programs conducted in association with NGO, IWMI, CARE and IUCN changed the behavioral pattern of the people and they became more disciplined in receiving water and using it efficiently. Positive motivational changes of the community leaders and the state officials dedicated their duty with higher management effort to mitigate the effects of water stress situation while developing the socio-economic condition of the

poor in the project.

FIGURE 5 Promotion and improvement of community based training

PROMOTE MULTIPLE USE OF IRRIGATION WATER

The projects showed that water is used not only for irrigating the field crops but also for livestock, inland fisheries, home garden cultivation, domestic uses, industries and environment and tourism also promoted.

There are many parallel functions carried out by the project to mitigate the adverse impact of water scarcity. Reservoir fisheries, reduced to 10% harassing the most fishing communities, where the project provide alternative income through brick making, sand mining etc, using the empty tank mud-soils. The power cuts that plunge people in to darkness every day have grown from two hours to eight as the water in the hydropower reservoir sinks to critical level in last years. However community gave their fullest cooperation to the engineers to manage the hydro power generation, while concerning the flows required to protect biodiversity, by saving the water.

The labor generated by the project during the execution of water supply works improved the economic status of community, the women self help groups 76 formed at village level made the women financially independent-saving by groups Rs 6546778.00 and inter-loaning among members Rs around 80 lacks.

CBOs and many self help community groups are also involved in the project management by constructing more sanitation facilities, like individual sanitary latrines, compost pits; community drains improved the health benefits and living standard of rural community through personal, domestic and environmental sanitation.

PARTICIPATORY FORESTRY PROTECTING THE ECOSYSTEM

Protecting the ecosystem, reforestation promoted in Kirindi River upper watersheds with peoples participation, under the Participatory Forestry program, while 65 % reduced over harvesting and exploitation by promoting training and awareness programs and giving incentives to inhabitants in the watersheds creating opportunities for the poor to generate income from forest product and services, i.e. mushrooms, medicinal plants etc. As well as prosecuting the culprits by enforcing laws with line agencies, i.e. Forest Department. Police Department.

Massive development program is going on within the river basin, Diversion of another river (Menik Ganga) to the Kiridi Oya, to cater to the proposed Southern Air Port and to the Hambantota Naval Port, large scale industries, garments, rice mills etc all are fed by the available water in the river. Estimated total annual demand for domestic water at 2.7 MCM. With all the increasing demands the community could managed the ecological and social value of the Kirindi River through this PMC management practices.

RECOMMENDATIONS

Stakeholder participation, education and awareness and life style changes are some of the most effective management tools in managing the ecosystem health while continuing to meet human demands for water in the community based water resources. The success or the failure of a comprehensive program may depend heavily on public participation and the team work. Therefore the close communication and regular consultation between and among the stakeholders and agency officials, combining with management practices like innovative ways to save water, appropriate water conservation practices, motivation changes of appropriate parties through awareness and training have to be assured in an efficient manner. The experienced gained through the Kirindi River in Sri Lanka, clearly demonstrates the effectiveness of such measures

for sustainable river and water shed management.

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