SOME PROMISING RESEARCH FIELDS FOR SUSTAINABLE WATER RESOURCES DEVELOPMENT IN SRI LANKA.

MAHINDA KURUKULASURIYA M.Sc, Ph.D, D.Sc., CEng, FIE(SL), MIE(Ind), MIE (Aust), MASCE, MCIWEM(UK)

1. Introduction

Freshwater is a basic requirement for life, yet water resources are facing increasing demands from, and competition among, users. Shrinking supply of freshwater in reality has not been due to the reduction of potential supply, but the pollution to which it is being subjected, the demands which are placed on this supply, have indeed increased, complicated by irregular rainfall patterns.

Water pollution is responsible for deaths and diseases transmitted by or through water. It has been estimated that 45% of Sri Lanka's rural population lacks safe drinking water and 55% lacks access to adequate sanitation.

The water use increased by a factor more than the rate of population growth. The population of Sri Lanka is approximately projected to increase from the current 18 to 25 millions in 2025. The result is already evident in the competition for water for agriculture (around 75%), domestic, and industrial purposes.

At the turn of the century, some estimates suggest that, the amount of water available to each person in Sri Lanka would be about half the 1950 figure. This situation is aggravated by the longer term threat of global warming with high impact on regional water resources significantly, having floods in some areas and droughts in others.

The current use of freshwater resources in our country is not sustainable. According to UN predictions, water withdrawal as a percentage of water availability by 2025 would be more than 40% for Sri Lanka.

2. Objectives

Ensure sustainable development through integrated rational use of water and other natural resources of Sri Lanka.

2.1. Specific Objectives

Research work specifically directed to improve the sustainability of water resources development.

* rational use of treated water in piped water schemes by minimising losses due to poor maintenance, avoid pilferage in distribution systems by community participation and introduce a separate system for washing purposes and flushing of toilets, in order to limit usage of treated water only for drinking.

* embark on rainwater harvesting.

* popularize alternatives to cut drastically use of firewood and /or replace firewood cooking in households to reduce deterioration of the environment.

* introduce purification of water through biological processes, solar distillation and other methods to ensure potable water to all.

* adapt new farming techniques to reduce irrigation requirements of water, minimise use of harmful fertilizer by introducing innovative farming (mixed farming, intercropping etc) to prevent pollution of water resources.

* control and govern watershed management, removal of sand from river-beds, release of water with high bed-loads to irrigation fields, salinity of irrigated fields including salt water seepage from the sea to inland and reclaim land uncultivated due to bad drainage.

* embark on ways and means of harnessing energy of the Indian Ocean for sustainable development (small scale electricity generation from sea water in a cell, wave, tidal and OTEC etc.).

* rehabilitation and study of aspects of ancient soil and water ecosystems and their integration and applications to modern water resources projects.

3. Problems Encountered

* increase in population demands more agricultural production, depletes the forest cover, consumption rises and ultimately reduces available water resources.

* destruction of forest cover to prepare more agriculture fields, intensive application of chemical/fertilizers to increase yields, practically 65% of the population uses firewood and other biomass for preparation of food, uncontrolled and intensive slash and burn cultivation, haphazard development activities etc. do result in pollution of water resources.

* irrational and uncontrolled use, wastage, non integrated utilisation of resources etc., would result in fresh water shortages in the near future.

4. New Approaches to Ensure Sustainable Development of Water Resources.

Considering various scenarios of population growth in Sri Lanka matched against the existing pattern of consumptions, destructions and pollution of natural resources, there have been several research work concluded indicating that there would be a shortage of fresh water in the island in the near future.

As a first step, the country should take account of natural resources such as water, land, forest etc. in each district /region / province and keep records of consumption /development/ destruction etc. and make the population aware of the trends of water use and consequences of unplanned development.

Water resources and natural resources development should be executed with the community collaboration at all levels, commencing from the grass root beneficiaries. This step guarantees prevention of catastrophic destruction of the environment, thus ensuring rational use of water and other natural resources.

4.1 Minimise Wastage and utilisation of Treated Water for Sanitation.

The community and the consumers should realise the cost of one cubic meter of treated water produced in a system and the benefits of the prevention of wastage and rational use brought to the society. Practical measures necessary, awareness, social mobilisation etc. could be initiated throughout the country to achieve goals.

4.1.1 Operation, Maintenance and Management

It should be properly established that the production costs in a system should be borne by the consumer. Research could identify the consumptions (drinking, washing, gardening etc) for dwellings and for encouragement of rational use, price structure could be established for enhanced payment for quantities beyond set-limits. Private enterprises should be formed in selected areas as pilot schemes, incorporating these measures.

Water released, distributed and consumed should be well accounted and maintenance personnel should be held responsible for their control. A system should be created to prevent illegal tappings and their detection, finally to punish and disgrace them in public. Success could be attained only through community participation. Public and private enterprises could set-up units for water supply and sanitation in rural and municipal areas.

4.1.2 Restrict Treated Water Exclusively for Drinking

In existing piped water schemes the treated water has been extensively applied not only for drinking and cooking purposes, but for gardening, washing, flushing of toilets etc. This aspect of use needs careful research and observations to make sure that the treated water to be used only for drinking. Alternatives for water supply for other purposes has to be thoroughly studied, researched to enable the available treated water to be extended to people in need. More than 50% of treated water is being utilized for other purposes and more than 35% of treated water goes as unbilled. A professional team of researchers should address the problems to look for a satisfactory solution within a limited period of several months. The investment on research could be justified within a year and the benefits accrued could be highlighted as follows : extension of available water to more people (50%); establish proper management; recover unbilled water costs for extension to others; and awareness of the community for conservation of water etc.

4.1.3 Rainwater Harvesting

In a very broad manner it could be mentioned that practically 50% of the population has no access to a source of safe drinking water and proper sanitation facilities. In order to provide all people of the country access to safe water and sanitation, viable alternatives have to be found. Pollution is causing widespread public health problems, adding to the water shortages, and causing serious harm to ecosystems, especially in rivers, lakes, man-made reservoirs and costal areas. Fresh water resources are unevenly distributed due to the precipitation pattern, but throughout the country there is rainfall, which could be harnessed to attain goals.

Contribution of rainwater harvesting to solve the national problems should be a high priority in the agenda for research. The following are highlighted for research attention : determine the per capital potential for drinking and agriculture purpose (especially in the dry zone); possibility to create stable eco-systems; improvements to present technology and future research for domestic systems (integrate rainwater system with air-conditioning, water supply and sanitation, energy generation etc).

4.1.4 Ancient Soil and Water Ecosystems

Ancient soil and water ecosystems that existed for more than 2000 years distributing water for irrigation in dry zone could be highlighted as unique in the world over. How these systems were planned, executed and managed should be studied and researched. Equal importance should be paid to the suffering of neglect, decline, deterioration and destruction of man-made water and soil ecosystems of Sri Lanka, to make sure that the existing / functioning systems could serve our country by promoting measures and applying some unknown management techniques of the past, which could be directly adapted for modern development schemes.

In ancient Rajarata and Ruhunurate water and soil conservation systems consisted of large networks of distribution canals. The gradient, linining etc. of these networks of channels play a great role for efficient water use. Taking into consideration the losses in irrigation distribution networks in this country, a serious effort should be launched to embark on research to minimise losses. Any investment should bring positive results within a limited period enabling the saved water to be utilised to increase agriculture produce.

4.1.5 Alternative Energies

Majority of the population uses firewood and biomass for cooking of food. Malnutrition of children under five years has been identified as a problem needing priority redressing. Affordable alternative energy for cooking of food, revolution in preparation and consumption of food etc. are important fields attracting research. Contribution of research would have immense impact to reduce malnutrition, minimise biomass use for food preparation and finally ascertain conservation of water resources.

Rural communities and communities living close to the sea shore do not have access to electricity for basic purposes such as drinking water, sanitation, refrigeration of vaccines/medicaments, house lighting etc. Instead of expecting the extension of the expensive national grid to those communities, innovative use of small scale renewable sources of energy would immensely contribute to sustainable use of water resources and conservation of the environment.

Community cooking during agreed periods using electrical energy produced from renewable energy sources, illumination of dwellings etc. are some of the basic needs of the population for raising of living standards. In order to achieve these, the following should be exposed to research, finally meant for conservation of natural resources:

* biogas production for cooking and lighting;

* harnessing of energies of water spouts (for example at Kudawella near Tangalla), tidal and waves of the ocean (prevents sea erosion); and

* integrated harnessing of energies of small rivers, solar, wind, OTEC etc. for rural development (encourage reduce slash and burn cultivation).

5. Conclusions

* Concerted research and their application should be a necessity for rational use of water resources
* Integrated utilisation of water resources should be established by responsible authorities having a central master plan.
* Private and public enterprises should be held responsible for management of water resources with complete cost recovery.
* Social mobilisation, community participation, public awareness etc. are major contributing factors for sustainable water resources development in Sri Lanka.

6. References

1. Bowlby S.R., Mannion A.M. Environmental issues in the 1990's, U.K. 1995.

2. Borwn L., Flavin C., Postel S. A World fit to live in, UNESCO Courier, London, 1991, p.28-31.

3. Energy Statistics yearbook, 1996, UN NewYork, 1997.

4. Energy Options, ITDG, Sri Lanka, 1992.

5. General Foley. Electrification for rural people, 1992.

6. Kurukulasuriya M. Model for integrated application of water, sanitation and environment for rural development, Zaire, UNICEF, July 1994.