

# BIRTH OF HYDRAULIC SOCIETIES AND MANAGEMENT SYSTEMS IN A SETTLEMENT PROJECT BASED ON IRRIGATED AGRICULTURE

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**Abstract :** The importance of water increases with both population and socio-economic growth. It is estimated that 80 percent of the water used by man today is for the cultivation of crops. However, there are different methods used by various countries implementing irrigated agriculture schemes. Irrespective of the measures adopted to enhance benefits from water resources development a cardinal principle followed is that the success of investment depends on the effectiveness with which water is used by the farmer.

Water development planning is a highly complex task. A new approach is needed in the initial planning, which ensures environmental aspects are integrated with socio economic considerations. However, in the planning and execution of irrigation and settlement projects, sometimes human and community factors are neglected.

Irrigation efficiency is also significantly affected by other factors such as, the level of training of the users, the quality of management, type of flow being operated, method of water distribution and the size of irrigation area.

The ecological consequences of irrigation are part of a complex of practices comprising management of available water resources, controlled distribution of water over cultivable land, and withdrawal of excessive water through drainage. These implications include the following.

- (i) Creation of new ecological systems related to water bodies such as reservoirs, canals and drainages.
- (ii) Radical modification of ecological systems of the terrestrial habitat due to ploughing, introduction of crops and addition of fertilizer and chemicals.

In the management of irrigation and settlement schemes, the potential for inland fisheries and livestock development should not be ignored.

The Mahaweli Ganga Development Scheme (MGDS) implemented in the year 1970 has been the largest integrated multipurpose project ever undertaken by the Government of Sri Lanka. The project was designed to exploit the water resources of the largest river, Mahaweli and adjacent river basins. The main objectives were to increase agricultural production, hydro-power generation, employment opportunities, settlement of landless poor and flood control.

(a) Poverty Reduction

Over 145,000 families have been settled in Mahaweli Systems or Development Areas todate. The total population living in Mahaweli area is approximately 800,000.

(b) Integrated Water Resources Management (IWRM)

The Mahaweli Authority of Sri Lanka (MASL) the state agency responsible for the implementation of the MGDS is now in the process of promoting integrated water resources management within the basins to maximize the resultant economic and social

welfare in an equitable manner without compromising the sustainability of vital ecosystems. Integration implies a concern with upstream-downstream relations, including land use, coastal zone management, a unified management of surface and groundwater, a shift to management at a catchment or river basin level and harmonizing water management with other seasonal policies with collateral impacts.

(c) Settlement Policy and Its Philosophy

A major social impact of human settlement programme of MGDS involves the transition from small isolated village communities to production oriented large scale societies. In a way this transition creates modernization of rural societies.

The settlement policy of the MGDS attempts to achieve three primary objectives.

- (i) The optimum use of limited resources of land and water in terms of social and economic demands of the society
- (ii) To establish self reliance character among settlers in an integrated community system
- (iii) To use the MGDS as a lead project to generate great impacts towards the overall development progress of the country.

The Distributary canals carry water from the Main or Branch Canals to each turnout structure from where the Field Canals take off to command a 'Turnout Area' of approximate extent 15 ha. The primary and secondary drainages are invariably natural streams except under special circumstances. The minor reservoirs are formed with earth bunds across primary or secondary drainages.

The selectees from the landless category who have been allocated 1.0 ha. or irrigable lowland farms and 0.2 ha. of homestead per family, supportive groups for the services sector are also provided in a network. Each village or hamlet is of size about 350 - 400 homesteads. To enable the settlers to use their own ability, skill and labour, the following subsystems do exist for exploration and exploitation.

- (i) Terrestrial Environment
- (ii) Aquatic Environment
- (iii) Human Environment

A rather new concept that has been injected into this new and hybridized society is to create an awareness and a sense of aesthetic values with regard to the physical environment. All these aspects are taken care of under the concept of river basin management.

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## **CHAPTER 1 - WATER RESOURCES AND PRODUCTION**

The importance of Water increases with both population and socio - economic growth. It is estimated that about 80 percent of the fresh

water used by man today is for the cultivation of crops. However, there are different methods used by various countries in implementing irrigated agriculture schemes.

Water resources planning is a highly complex task. A new approach is required in the initial planning which ensures integration of environmental aspects are integrated with socio-economic considerations.

The ecological consequences of water resources management are part of a complex of practices comprising management of available water resources, controlled distribution of water over cultivable land and withdrawal of excessive water through drainage. In the management of irrigation systems with settlement schemes, the potential for inland fisheries and livestock development should not be given low priority or ignored.

The traditional irrigation schemes in the dry zone managed by the Irrigation Department as far as water management is concerned are based on large and medium size storage reservoirs, designed to provide supplemental irrigation during the 'wet' season (North East Monsoon) or "Maha" with any residual water used for limited dry season or (South-West Monsoon) or "Yala" cropping.

These schemes had, however, been planned to meet certain limited requirements such as production, settlement and landlessness only. Optimization of the available water resources and avenues for more modernized system of integrated rural development had not been given much importance in the planning. Furthermore, community development and environmental concerns have not been given much importance in the objectives of the schemes. In short, these schemes had not been planned properly, taking into consideration serious conflicts between the society and the physical environment to ensure that natural resources were used in harmony with the growth of the economy as well as with a healthy living environment.

The corrective measures adopted in planning a development system of this nature has been the new concept demonstrated in the Mahaweli Ganga Development Scheme (MGDS) implemented in the year 1970.

## **CHAPTER 2 - MAHAWELI GANGA DEVELOPMENT SCHEME AND ITS CONCEPTS**

The Mahaweli Ganga Development Scheme (MGDS) implemented in the year 1970 has been the largest integrated multipurpose project ever undertaken by the Government of Sri Lanka. The project was by the Government of Sri Lanka. The project was designed to exploit the water resources of the largest river, Mahaweli and adjacent river basins. The main objectives were to increase agricultural production, hydro-power generation, employment opportunities, settlement of landless poor and flood control.

There are thirteen independent agricultural areas under the umbrella of the MGDS. Each agricultural area or the development area has natural boundaries and is called a "System", implying that they are viable functional systems. All these systems lie in the dry zone of Sri Lanka, and are identified for irrigated agriculture and human settlement.

Under the development exercise in each system currently underway in the MGDS following factors have been taken into consideration in order to yield the most appropriate integrated development system from the point of view of community development.

- (i) Most suitable irrigation system
- (ii) Settlement planning based on cluster village concept
- (iii) Essential social infrastructure provided
- (iv) Introduction of appropriate cropping patterns

- (v) Improved water management practices
- (vi) Optimization of rainfall
- (vii) Diversification into subsidiary crops on more permeable soils
- (viii) Provision of guidance on community well-being, technical know-how and advice on agricultural and other allied activities.

The settlement policy and its philosophy adopted in the MGDS so far can be briefly stated as appended below.

A major social impact of human settlement planning in the MGDS involves the transition from small isolated village communities to production oriented large scale societies. In a way this transition creates modernization of rural societies. The settlement policy of the MGDS therefore attempts to achieve three primary objectives.

- (i) The optimum use of limited resources of land and water in terms of social and economic demands of the society
- (ii) To establish self-reliance character among settlers in an integrated community system
- (iii) To use the MGDS as a lead project to generate great impacts towards the overall development progress of the country.

Providing essential social and economic infrastructure required by the settler population through a hierarchy of human settlement structure has been done using the following criteria in determining the composition and functions of the hierarchy.

- (i) Size of population required for provision of basic public services such as, education, health and agriculture supporting activities.

- (ii) Viability of functions such as water management, land development and civil administration and their capability in the context of national set up.

Based on the above criteria, four types of settlements have been identified. They are Hamlet, Village, Area and Township level settlements.

The selectees from the landless category who have been allocated 1.0 ha. of irrigable lowland farms and 0.2 ha. of homestead per family, supportive groups for the services sector are also provided in a network. Each Village or Hamlet is of size about 350 - 400 homesteads.

To date over 145000 families have been settled in Mahaweli Systems or in the Development areas managed by the custodian, Mahaweli Authority of Sri Lanka. The total population living in Mahaweli Systems is approximately 800,000.

### **CHAPTER 3 - EXISTENCE OF PHYSICAL SYSTEMS AND THEIR INTERACTION**

In each area, it can be identified as having a number of sub-systems performing various functions for different organizations of things. On this basis, the human environment can be treated as being represented by the human system. No sub-system can exist as a completely independent unit. All systems are open and therefore, the output from one can become the input to another. As a result any change in one sub-system will be reflected in changes in all other sub-systems.

Following are some of the sub-systems closely associated with human sub-system in community development.

- (i) Irrigation System
- (ii) Project Management
- (iii) Settlement Network
- (iv) Minor reservoir network

- (v) Health & Welfare
- (vi) Education

In applying the systems concept to the human system, it can be demonstrated that the driving force behind the success of human development is now the various sub-systems interact mutually. The basic principle behind the community development task is therefore, the effective and appropriate interactions of the human sub-system with other sub-systems in working towards its goals.

Human communities are complex collections of people with a mixture of needs, desires, preferences, and habits. Changes to these which lead to greater satisfaction or human welfare constitute community development, irrespective of those changes being economic, social, political or cultural.

Water is certainly the most significant component of community development in irrigated agriculture oriented human settlement projects, because water is essential for human survival. The relationship between water and community is clearly displayed in the irrigation of agricultural land. The most fundamental objective of integrated rural development task has been agricultural development, for which the appropriateness and efficiency of the irrigation system are of paramount importance.

It is imperative for a community to work selflessly for the good and welfare of the entire group for it to make any headway in community development. However economic growth alone does not lead to progress of man. Therefore the areas which have been identified for community development in this water

based society are, Health Care, Nutrition Supply, Sports & Recreation, Spiritual awareness, Cultural Activities, Education, Economy, Social Cohesion, Moral cleanliness and Enterprise.

It has to be emphasized that the three environments which encompass each Mahaweli System or Development Area are therefore, the Terrestrial, Aquatic and Human. The Eco-system too lies in these environments.