

Integrated Water Resources Management : Issues and Challenges

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Abstract : Water is vital for human survival and for economic development of a region. The need to maintain available water resources for water resources development, provision of good quality and sustainable quantity of water to cater increasing population and for the optimum benefit in development of the region should therefore be a priority for any country hoping to improve and sustain adequate standard of life for its populace. However conflicting demands for this resource often make decisions very critical: e.g., the water available for hydropower generation against the downstream development for irrigation. There, a need therefore is to have clear, long-term management policies to ensure optimum benefit to the region. The Integrated Water Resources Management facilitates appropriate planning, feasibility and implementation of water resources projects and management through development of policies, legal framework, appropriate manpower development and consideration of important driving factors including economics, social aspects, environment and political climate. International organizations and donor agencies also have a critical role in this process by providing necessary support through sharing of knowledge and best practices and ensuring that lessons learnt from the past are fully incorporated into new ventures. This paper has also revealed the major issues and challenges for those IWRM components within the developing countries.

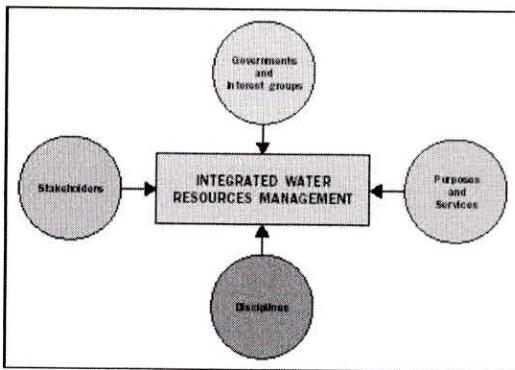
INTRODUCTION

Integrated Water Resources Management (IWRM) is a framework for the sustainable development and management of water resources for the whole society. In this regard IWRM plays a role in socio economic and particularly in sustainable development and poverty alleviation. The sustainability remains an academic concept unless it is linked to clear objectives that must be attained in given territories and to the management processes needed to achieve this. Management of the natural resources located within an interest area of a river basin is one of the valuable option for guiding and coordinating processes of management for development in the light of environmental variables. In order to turn

environmental policies into concrete actions it is necessary to have suitable management bodies, which are normally very complex. The establishment of such bodies means generating a mixed public and private system which should not only be financially independent, socially oriented and sensitive to environmental aspects, but must also act in a democratic and participative manner. In the past, the idea of establishing bodies to guide the management of the natural resources of a river basin (especially water, of course) has aroused the interest of the countries of Latin America and the Caribbean, with varying results. This interest has now become an urgent necessity, in view of the greater competition for multiple water use and the need to control water pollution and manage the environment correctly

What is Integrated Water Resources Management

Water Resources Management is an integrating theme for a number of water sub-sectors such as Hydropower, Water Supply and Sanitation, Irrigation and Drainage, and Environment. An integrated water resources (IWRM) perspective ensures that social, economic, environmental and technical dimensions are taken into account in the management and development of water resources



Integrated water resources management begins with the term “water resources management” itself, which uses structural measures and nonstructural measures to control

natural and human-made water resources systems for beneficial uses. Water-control facilities and environmental elements work together in water resources systems to achieve water management purposes.

Need for Integrated Water Resources Management in Punjab

The State of Punjab is part of the Indus River System in the north and north-west of the Indian Sub-continent. It is separated from the Ganga basin by the Ghaaggar River. It flows only seasonally and is famous for its flash floods in the south-eastern parts of the state. Other significant perennial rivers of the Indus system, which flows through Punjab, are Ravi, Beas and Satluj that together carry 40.5 x 10⁹ m³ of water. Himalayan glaciers melt account for about 58% of the source water supply of these rivers. All these rivers are tapped by using dams at different levels in the catchment areas and stored water is utilized for irrigation through a strong network of canals in the command areas.

Punjab state occupies 5.03 mha comprising only 1.5 per cent of geographical area of India. It has experienced a phenomenal increase in agricultural production during the last three decades, mainly due to extensive adoption of rice-wheat cropping system with assured irrigation facilities and has helped India in achieving self-

Table1: Status of water resources in Punjab

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|--|-------------|
| Annual canal water available at Head Works | 14.54 m ham |
| Annual canal water available at outlets | 1.45 m ham |
| Annual ground water available | 1.68 m ham |
| Total annual available water resources | 3.13 m ham |
| Annual water demand | 4.40 m ham |
| Annual water deficit | 1.27 m ham |

sufficiency in food. The dominance of rice-wheat system has caused reduction in area under low water requiring crops, which led to over exploitation of groundwater resource, as the surface water is not adequate to meet the irrigation needs of the state. The number of tubewells has increased from 0.19 million in 1971 to 1.17 million in 2005. The average annual rainfall is 580 mm and is ill distributed in time and space. The total water supply of 3.13 m ham falls short by 1.27 m ham of the total water demand of 4.40 m ham

The problems being faced by the water sector in Punjab demand a holistic look at the issue of management of surface and ground water resources. This is important as these two are interdependent and any management activity in the surface water sector is bound to affect the ground water sector and vice versa.

Scientific management of water resources of our country also calls for a judicious mix of various supply side and demand side management interventions. As far as ground water resources are concerned, augmentation of resources, especially in over-exploited and critical areas, through suitable techniques of artificial recharge techniques to utilize surplus run off available is of the highest priority.

A nationwide rainwater harvesting and artificial recharge programme will help in augmenting groundwater availability, better distribution of water resources, flood control moderation, reducing soil erosion and increasing storage. This would involve accelerated programme of watershed development and rainwater harvesting and also providing incentives for rainwater harvesting in urban areas and making it mandatory for large buildings. Other strategies such as conjunctive management of available resources, pricing and regulation, water conservation etc. are also important in this regard.

Issues related to water quality also need to be addressed. Research and development

initiatives, capacity building among various stakeholders and creation of awareness among the masses could also help initiatives for sustainable water management to a considerable extent. Such a holistic approach is possible only through the concerted efforts of planners, policy makers, administrators, scientists and the water users themselves.

Challenges to future Water Management Integration

The term "functional integration" means to join purposes of water management such as to manage water supply and wastewater within a single unit. Protecting aquatic habitat for natural and ecological systems while managing for flood control is another example. Still another term is "conjunctive use," which usually refers to the joint management of surface water and groundwater.

A major issue remains for which no definitive answer is available at present. This is whether IWRM could indeed be effectively applied in the real world as an effective instrument to improve the standard of living and quality of life of the poor people and if so, how, and if not, why not. Since the main objective of water resources management in developing countries is to improve the quality of life of people, this is an issue that needs urgent attention.

Are the current legal and institutional frameworks in your country conducive to good IWRM planning and implementation? Disaggregated organizations represent strong power bases and vested interests: who will have the authority and will to bring them together? Bearing in mind the principles of IWRM, who should make the decision on the final prices charged for water services and why?

Legal Angles and Interest Groups

Accommodating the views of governments and special interest groups is a challenge in integration because they have different

perspectives. Intergovernmental relationships between government agencies at the same level include regional, state-to-state, and interagency issues. Relationships between different levels of government include, for example, state-federal and local-state interactions.

Special interest groups range from those favoring development of resources to those favoring preservation. In many cases, conflicts arise between the same types of interest groups, as, for example, between fly fishers and rafters on a stream.

Geographic Regions

The views of stakeholders in different locations must be balanced, introducing a geographic dimension of integration. Examples include issues between upstream and downstream stakeholders, issues among stakeholders in the same region, and views of stakeholders in a basin of origin versus those in a receiving basin. Another aspect of geographic integration is the scale of water-accounting units, such as small watershed, major river basin, region, or state, even up to global scale.

Coordination and Cooperation

Coordination is an important tool of integration because the arena of water management sometimes involves conflicting objectives. Coordinating mechanisms can be formal, such as intergovernmental agreements, or informal, such as local watershed groups meeting voluntarily.

Cooperation is also a key element in integration, whether by formal or by informal means. Cooperation can be any form of working together to manage water, such as in cooperative water management actions on a regional scale, often known as "regionalization." Examples of regionalization include a regional management authority, consolidation of systems, a central system acting as water wholesaler, joint financing

of facilities, coordination of service areas, interconnections for emergencies, and sharing of personnel, equipment, or services.

Interdisciplinary Perspectives

The complexity of integrated water resources management requires knowledge and wisdom from different areas of knowledge, or disciplines. Blending knowledge from engineering, law, finance, economics, politics, history, sociology, psychology, life science, mathematics, and other fields can bring valuable knowledge about the possibilities and consequences of decisions and actions. For example, engineering knowledge might focus on physical infrastructure systems, whereas sociology or psychology might focus on human impacts.

Total Water Management

Integrated water resources management can take different forms and is examined best in specific situations. In the water-supply field, the term "integrated resource planning" has come into use to express concepts of integration in supply development. Perhaps the most comprehensive concept for water supply is "Total Water Management."

According to a 1996 report of the American Water Works Research Foundation, Total Water Management is the exercise of stewardship of water resources for the greatest good of society and the environment. A basic principle of Total Water Management is that the supply is renewable, but limited, and should be managed on a sustainable-use basis

DICUSSION AND SUMMARY

Integrated approach in water resources management requires a full commitment from all levels stakeholders. Past experience shows that implementation of IWRM is a process that could take several decades. Success in some areas may

be accompanied by continuing challenges in others. Certain goals such as full economic sustainability and reconciling human water needs with the needs of ecosystems will require substantial changes to current practice and culture, and will therefore take even longer to achieve. Given the short-term focus of politicians and policymakers in most areas, there is always the temptation to seek quick solutions and abandon the IWRM process if immediate gains are insufficient. But persistent, patient progress on multiple fronts is necessary to achieve the ultimate goals of IWRM. It is important to develop a sequenced, prioritized list of reforms to avoid getting bogged down in partial implementation of too many reforms.

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