

A Review on Integrated Water Resources Management for Solving Water-related Issues

Md. Hamjala Alam^{1*}, Santanu Gayen², Dr. Vijay Kumar Dwivedi³

¹Ph.D Scholar, National Institute of Technology Durgapur

²Ph.D Scholar, National Institute of Technology Durgapur

³Professor, National Institute of Technology Durgapur

E-mail: ¹mha.18ce1505@phd.nitdgp.ac.in, ²mha.18ce1506@phd.nitdgp.ac.in, ³vijaykumar.dwivedi@ce.nitdgp.ac.in

Abstract—According to the Global Water Partnership (GWP), Integrated Water Resources Management (IWRM) may be defined as a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. This concept was introduced in 1980s to supplement water uses between different water demanding sectors. IWRM gives a holistic approach to integrate water for miscellaneous sectors. Water, as we know, is a transparent, tasteless, odourless, and colourless substance, which is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. It is vital for all known forms of life. Water plays an important role in the world economy. Much of long-distance trade of commodities (such as oil and natural gas) and manufactured products is transported by boats through seas, rivers, lakes, and canals. Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is indeed the most essential resource which is inevitable to the society as a whole, as well as a pre-requisite to most development-related public institutions. Water is a quintessential element to other important sectors like food, energy, environment, health and transportation. In an increasingly interrelated and complex world, many issues are of pervasive interest for assuring good quality of life of the people. In recent times population, urban population to be precise has increased by many folds. As a consequence, there has been a tremendous increase in competition for water across multiple sectors. Rampant and widespread overexploitation of groundwater is a major issue before us. In addition to that climate change, global warming, agricultural sector's increased water demand and water industry development all increase the challenge for integrated water resources management. Health and transportation. In an increasingly interrelated and complex world, many issues are of pervasive interest for assuring good quality of life of the people.

1. INTRODUCTION

Water is the most valuable and essential of all the resources available to us. It is true that without water life will simply cease to exist. According to a famous Greek philosopher, the best of all things is water. This is a very witty statement and will hold good till eternity. The need for water has been quintessential throughout human history. Almost all the civilizations have flourished on the bank of the major rivers of the world. Water is constantly in motion, passing from one

region to another and from one location to another. But be it in any condition, moving or stationary, water invariably contains extraneous materials, some due to natural causes but broadly due to anthropogenic activities. In recent years, urban populations have grown at such phenomenal rates in combination with the growing scarcity and increasing competition for water across multiple sectors.[1]. All these factors, in addition to natural variations in water obtainability, make its coherent planning and management a very arduous and difficult task under the best of circumstances. Today, water concern remains high on many national agendas, and water resources security is an issue that is common to some global threats.[2]. Water may be everywhere, but its usage has always been governed by its availability both quantitatively and qualitatively. All around the world, issues related to water are neither constant nor consistent over time. They always vary very considerably from one region to another, sometimes even within the same country, from one season to another, and also from one timespan to another. Solutions to this problem depend not only on water availability, but also on several other factors, among which are the processes through which water is managed; proficiency and capabilities of the establishments that manage them; prevailing socio-political situations and prospects which affect water planning, development and management processes and practices; appropriateness and implementation status of the legal and regulatory frameworks; availability of financial assistance as and when required; climatic, social and environmental conditions of the countries concerned; levels of available and functional technology; national, regional and international approaches and perceptions; modes of governance including issues like political intrusion, transparency, accountability, corruption, etc.; educational and developmental conditions; and quality, effectiveness and relevance of research that are being conducted to address the national, regional and local level water issues. Water is an enormously profound resource that is of direct concern to the society as a whole, as well as to most development-related public institutions at central, state and local levels. Such extensive concern for water is not a unique situation, as many water professionals have often claimed: it is

equally applicable to other important sectors like food, energy, the environment, health, transportation.

All these issues demand and deserve a high level of socio-political responsiveness in all modern societies, although their relative importance may vary from one country to another, and also over time. In an increasingly interrelated and complex global village that the world has become, many issues are of inescapable importance for assuring good quality of life of the people. Water is one of these vital intersect oral issues. In recent years, it has become increasingly evident that the water problems of a country can no longer be resolved singlehandedly by the water specialists, or the water ministries alone. The water-related problems are becoming increasingly more and more interconnected and intertwined with other development-related issues, and also with social, economic, environmental, legal and political situations, at local and national levels, and sometimes even at regional and international levels. Many of the water problems have already become far too complex, interconnected and large enough to be handled by any single institution, irrespective of the authority and resources available to it, technical proficiency and management capability available, level of political and public backing and cooperation.

2. INTEGRATED WATER RESOURCES MANAGEMENT: BRIEF DESCRIPTION

There is a popular saying that third world war would be fought over water. Almost all the countries of the world are facing water crisis in some way or the other. There is an urgent need for the effective management and sustainable utilization of the enormous water resource gifted to us by Mother Nature because of the disproportionate and uncontrolled population explosion. However, this crisis was being conceived long ago. In 1980s it was being realized that global water scenario was not in proper condition. People associated with water-related works be it conceptualization, design or supply, developed the perception that the water-related issues were multi-dimensional having a widespread and far-reaching impact. For the time being, the main question is how to mitigate the water crisis and whether this can be achieved in the real world in a timely, cost-effective and socially acceptable manner or not? Having witnessed such unparalleled management complexities, many in the water profession started to look for a new exemplar for management, which would solve the existing and anticipatable problems in different parts of the world. The solution that was contemplated and which was widely applauded was not a new concept. It was the ramification of fundamentally more than- 60-year-old concept, which could not be effectively implemented previously: integrated water resources management.

A meticulous and comprehensive objective-driven assessment of the recent literatures of the institutions that have robustly championed the concept of integrated water resources

management indicates that not only no one has a clear idea as to what exactly this concept means in operational terms, but also their views of it in terms of what it actually means and encompasses by and large. Thus, there is an increasing global interest in an integrated water resource management (IWRM).[3]. Even it can be claimed that this very defilement has contributed to the high popularity of the integrated water resources management concept since people could continue to do what they had done previously, or are doing at present. The Global Water Partnership defined it as a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.[4].

3. OBJECTIVES TO BE ACHIEVED THROUGH INTEGRATED WATER RESOURCES MANAGEMENT

As we all aware and we are witness to this fact that water availability, severe drought, intensified flood, depleting groundwater resources are the burning issues that almost all the countries of the world are facing nowadays. An enormously large section of the people does not have access to clean potable drinking water. An equally great number of people get killed, displaced, and huge losses of lives and properties take place every year due to massive floods which occur every year. All these happen due to lack of planning for proper management of water resource, lack of provision for storage and recharge of groundwater and loopholes in the execution of water-related programmes. So obviously the biggest and utmost important objective of IWRM is to plan, design and implement effectively water-related programmes for the sustainable development of water resource, proper and judicious distribution and effective safe keeping of this magnificent bounty of nature. IWRM is broadly based on the three important principles: social equity, economic efficiency and environmental sustainability. So the major objective to be achieved through IWRM has to cater to the above mentioned three principles.

Social equity aims at guaranteeing equal accessibility for all users to an optimum amount and quality of water essential for the survival of mankind. The stake of all users to the profits obtained from the usage of water requires to be inculcated while making specific water apportionments. Benefits may include availing of resources through recreational use or the financial gains obtained from the utilization of water for economic purposes.

Economic Efficiency envisages on obtaining the ultimate benefit to the highest number of users possible with accessible economic and water resources. It compels that the most economically viable option is implemented. The economic assessment is not only about cost – it should sustainably

consider existing and future societal and environmental expenses and profits.

Ecological Sustainability requires that marine ecosystems are acknowledged as stakeholders and that adequate provision is made to put up with their natural functioning. Achieving this criterion also requires that land uses and developments that undesirably impact these systems are eliminated or restricted.

Practically, IWRM approaches involve utilizing information from various disciplines as well as the perceptions from diverse stakeholders to invent and implement efficient, equitable and sustainable solutions to water-related issues and sustainable development programmes. As such, IWRM is a comprehensive, inclusive planning and implementation tool for managing and developing water resources in a way that equilibrates social and economic needs, and that ensures the safety of ecosystems for future generations.

4. CHALLENGES IN THE WAY OF IMPLEMENTING IWRM

In real practice, integrated water resources management, even in a limited sense, turns out to be challenging to achieve because of extensive tussle and political rivalry and egoistic conflicts between nations, states, districts. Lack of coordination, correspondence, poor foresightedness, ignorant vision, corruption and above all lack of empathy for the people worst affected by various forms of water-related calamity are the major hindrance in the path of effective implementation of IWRM. Integrated management of two or more resources by institutions that have been historic rivals is an almost impossible task. It is also noteworthy that water has intrinsic connections to all development sectors and socio-economic issues such as poverty alleviation and regional income redistribution. Some people hold the notion that integrated water resources management is a voyage and not a destination, and the concept provides only a road map for the journey. But it is also true that without knowing the beginning and the endpoint, road maps are of very inadequate. Lastly, it is not very helpful to dwell on ambiguous and unimplementable concepts lacking implementation potential, as has been the case so far for integrated water resources management. There are also some negative implications of integrated water resources management, which, for the most part, are not being seriously considered. Already in a few countries, there are incidents that the major national water institutions are trying to take over other water-related institutions in the name of more effective integration.

5. CONCLUSION

The concept of IWRM is not a new concept. But indeed it is a very effective and efficient technique for the sustainable development and utilisation of the water resource. Every now and then we see water-related issues be it drought, flooding, depleting groundwater resource, water wastage, pollution of water, and so on. In river basins of the rivers all over the world, water level keeps on fluctuating. Sometimes water level becomes so abundant that it crosses the banks and submerge the areas adjoining on both sides of the river banks. On the other hand, sometimes the rivers dry out with very little or no water left to cater to the needs of the people. The scrutiny of research status on integrated water management and climate change adaptation and the case descriptions present a variety of scientific tactics and strategy needs in the field of water management. Climate change, in combination with other complicated issues, has further aggravated the management of water resources. IWRM, if implemented effectively in its entirety, can prove to be an efficacious solution for all the above mentioned water-related problems. IWRM can assist the water managers in establishing better balance for the water usage between different sectors.

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