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Concepts and Approaches of Integrated Water Resources Management in Indian Scenario

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Abstract—*Due to outburst of population leads to increase demand of water, increased use of water in various sectors especially in agricultural sector, water logging, excessive extraction of groundwater has depleted the water table, problem of desalination or over-consumption of water has declined the level of different water resources and there is also declining of water availability due to climate change. So to tackle with this problem, integrated approach of water resources management has come into force which is not a new concept but it has been around some generation. So the management of water resources has become a strong emerging tradition based on controlling environmental problems with technical solution. The implementation of integrated management of river basin and transboundary river basin in particular poses major challenges to the integration of different administration, legal, cultural, institutional and economic tradition from local to international. Lately water shortage has become a major issue for achieving high living standard and for development thus an integrated approaches for the sustainable exploitation of all potential water sources is needed. The integrated approaches for water resources management are more common in arid or semi-arid water deficit areas. When there is less alternative for water management then non-conventional water resources are expected to play an important role in water management. Integrated water resources management is an integration of inclusive and sustainable management of river and lake basin which is a recent phenomenon of it. Integration actually does take place in a strategic context thereby facilitating consensual decision to integrate water management for sustainable future.*

Keywords*: Resource Management, Sustainable, Management, Integrated approaches, River basin.*

1. INTRODUCTION

Integrated Water Resource Management (IWRM) is increasingly gaining prevalence in the contemporary discourse on water. The discourse however, is influenced mainly by the two popular perspectives on water via; scarcity and crisis management. Therefore focus of the discourse has shifted from development of water resources for its productive use and thereby poverty reduction, to demand management through pricing and centralized formal structures for governing water use and sectorial allocations using river basin as a unit. Originated as a response to ensure and also further promote developmental as well as ecological functions performed by water, IWRM as defined by the Global Water Forum (GWP) has brought into its fold a number of noble ideas such as coordinated efforts for water and land resources; maximization of welfare along with equity; and ecological sustainability (GWP, 2000:22). The definition though, acclaimed for pooling together a bunch of well-intended and uncontestable ideas, has been criticized for being ambiguous and imprecise and amenable to significant distortions leading to undermining the very spirit of IWRM as a process oriented, people focused, and sustainable development of land and water resources (GWP, 2000).

The condemnation is basically based on the specific alternative of IWRM which has been developed and implemented by the World Bank in developing countries like Asia and Africa. This alternation was recognized as the `mainstream' approach for IWRM. Integrated Water Resource Management (IWRM) is progressively gaining more currency in the existing discourse on water. The discourse is still influenced by the two popular perspectives on water viz; scarcity and crisis management. Therefore focus of the discussion has shifted from development of water resources for poverty reduction, to demand management through pricing and central formal structures for governing water use and sectoral allocations using river basin as a unit. IWRM is defined by the Global Water Forum has brought into its fold a number of noble ideas in corresponding to water and land resources; maximization of welfare along with equity; and ecological sustainability (GWP, 2000:22). The definition though, acclaimed for pooling together a bunch of well-intended and uncontestable ideas, has been criticized for being ambiguous and imprecise and amenable to significant distortions leading to undermining the very spirit of IWRM as a practised oriented, people focused, and sustainable development of land and water resources. Criticism is based on the specific variant of IWRM, developed and implemented by the World Bank in some of the countries in Asia and Africa. This variation, recognized as the `mainstream' approach of IWRM (notwithstanding the scope for alternative interpretation of the very broad and least precise definition consists of features like: declaring water as state property;

instituting water withdrawal permits; pricing of water except for drinking and domestic use; and setting up river basin organization for deciding allocation of water[31,12].The central thrust of the approach seems to be on centralized governance and pricing with nationalization of ownership and adoption of larger unit for management such as river basins. The features that are important from the viewpoint of equity and sustainability are seen more as playing instrumental roles. Since most of the critiques have recognized IWRM as an ideal goal or an ideology worth exploring, it is imperative to ensure that the baby (i.e. the concept itself) is not be thrown out with the bath water. According to Mollinga (2006), the boundary concept would create a common ground and will allow different interest groups to interact more constructively. While there may not be any monolithic perspective on what could be the constituent features of IWRM, a common ground could be built by drawing from the three important aspects on which global consensus seems to have been achieved. These are river basin unit; stake holder involvement, and privatization[6]. These elements may work as useful starting points for triggering processes of informed dialogue, which could then help attaining and the three important goals via; (i) eco-system based units for integrated land and water management with multi-layered planning and governance; (ii) people's participation leading to efficiency and accountability; and (iii) blending of markets and institutions that are formal as well as informal. A number of initiatives have already been undertaken in India and the developing countries by incorporating some or most of the features of IWRM noted above.

Initiatives such as watershed development, sub-basin management, rain water harvesting and ground water markets are some of the examples in this context. However, much of these have remained scattered, smaller in scale, and have generated impact at local/micro setting as borne out by experiences of a large number of watershed projects in the country [4, 5, 9]. Notwithstanding the limitations, these initiatives could work as building blocks for evolving a new perspective for integrated development of natural resources with centrality of water across different agro-consists of features like: declaring water as state property; instituting water withdrawal permits; pricing of water except for drinking and domestic use; and setting up river basin organization for deciding allocation of water [11-12]. The central thrust of the approach seems to be on centralized governance and pricing with nationalization of ownership and adoption of larger unit for management such as river basins. Since most of the critiques have recognized IWRM as an ideal goal or an ideology worth exploring.

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2. CONCEPTUALIZATION OF IWRM

Global Water Partnership (GWP) defines IWRM 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 ecosystem (GWP, 2000). The definition, as noted earlier, neither has universal applicability, nor is binding under varying situations pertaining to resource endowment, stages of economic growth, and socio-political structures across countries. In fact the need is to explore multiple approaches with a view to arrive at a broad notion of IWRM, which suits the context specific requirements as well as challenges of water resource management in each country. The mainstream IWRM thinking looks at IWRM as one of the means to move away from the earlier sub-sector based approach to a more holistic or integrated approach, which prima facie, could address the emerging challenges of water resource management such as increasing scarcity (water stress), inter-sectoral conflicts, pollution and lack of technical understanding on issues of water catchments. In this sense, IWRM is being viewed as a tool to mitigate the past abuse and to ensure the sustainability of water resources in the future[4]. The main opponents of the 'mainstream' concept however, treat IWRM as narrowly defined, underpinned by neo-liberal principles, dominated by technical and managerial concerns and informed by limited methodology and empirical data. It is also point out the constraints such as (a) difficulties in collection and use of social data corresponding the hydrological units; (b) limited technical capacity; (c) lack of integration between cultural aspects of water; and (d) non-congruence with the concept of decentralized governance gaining ground in a number of developing economies. It is further alleged that using hydrological unit for implementation of an integrative planning may not be feasible as it does not necessarily coincide with the political or administrative unit[7].

Shah and Kuppen's model of the evolution of a water economy is based on the stage of its formalization which in turn depends upon the overall economic evolution of the economy. According to them, regardless of its water endowments, as a low-income economy climbs up the economic ladder, the organization of its water economy undergoes a transformation in tandem with the transformation

of the society. They argue that IWRM paradigm will not work in India because it is governed by large informal water economy and hence does not have a formal class of intermediaries i.e. water service providers for meaningful water demand management. According to them, water management goals can be addressed only through indirect policy instruments in India at the moment to entice or compel private institutional arrangements and therefore it is better to focus on supply side management of more water infrastructure promotion. Further, as India urbanizes and gets richer, highly formalized segments will emerge especially in cities and hence direct demand management options will emerge which is an ideal framework of IWRM to operate effectively.

3. WATER RESOURCES STATUS AND UTILIZATION PATTERN

India receives an average annual precipitation of 4000 BMC, including snowfall. The average annual water potential of the rivers of the country is 1869 BMC. It is estimated that the total utilizable surface and ground water potential is 690 BMC and 432 BMC respectively, adding up to 1122 BMC. The rainfall in India is highly seasonal and 50% of this is received in just 15 days; 90% of the rivers are seasonal and flow for around 4 months (World Bank, 2005). The growth in population and the changes in water use pattern mainly due to development are responsible for the escalation of water demand in the domestic and industrial sectors. The per capita water consumptionis assumed to increase from 85 LPCD to 125 and 170 LPCD in 2025 and 2050 respectively. There are several urban and rural pockets in India where people are not having access to potable water. The present water demand for domestic purpose is estimated to be 42 BMC, which would go up to 107 BMC in 2050. According to certain official estimates, water supply and sanitation coverage is 89% and 34% respectively (CWC, 2003). However, actual field conditions indicate that the country has to go a long way to fulfill the millennium development goals. An estimate made by the National Commission Integrated Water Resources Development (NCIWRD 1999), has projected the industrial water demand to 30, 101 and 151 BMC in 2000, 2025 and 2050 respectively.

An analysis considering global trends shows much higher values. There have been several attempts to construct large-scale water storage structures after independence to help the agrarian community and also to increase food production. This trend was started even during the colonial period as evidenced by the evolution of a tradition in irrigation in the Indo-Gangetic plains of the north and the construction structures like the Mullaperiyar dam, more than a century ago in the far south. The live storage capacity of the country is estimated at 418.05 BMC and the capacity of completed, under-construction and underconsideration projects are 220.76, 84.32 and 112.97 BMC respectively (CWC, 2004)The initiatives in India during the First Five Year Plans have considerably helped in food security and poverty reduction especially in water-scarce areas. Major and medium projects completed during pre-plan, up to Ninth Plan and in the Tenth Plan are 217, 928 and 383 respectively. But, most of these projects were not properly operated and maintained and therefore calls for large investments make them functional in future. The tendency has been to “build-neglect-rebuild”.

4. IWRM AND WATERSHED DEVELOPMENT

It is plausible that IWRM, taking river basin as a unit of management, could create conditions for a well-synchronized approach where development of surface irrigation and recharging of ground water through watershed development are integrated. In turn, this may also help striking a balance between economic and ecological functions of water within a geo-hydrological unit. Unfortunately, a coordinated approach such as this is neither clearly worked out nor has been implemented on a larger scale. This is evidenced by the compartmentalized approaches adopted for sustainable management of natural resources (especially water), economic growth and poverty reduction, and water governance at different levels. This is a serious problem in so far as it perpetuates irrigation centric, engineering oriented, and bureaucracy driven approach for water resource development with limited concerns for equitable distribution and sustainability of the use. Some of these features appear glaringly in the recent Water Policy, 2002 in India [1].

5. CHALLENGES AND FUTURE PERSPECTIVES FOR INTEGRATED WATER RESOURCES MANAGEMENT FROM LOCAL TO RÉGIONAL LEVEL

Implementation of the challenges for IWRM in the developing world mainly deals with the integration. A key challenge for understanding the concept of this which is defined in a different way by different authors and practitioners which have influenced the various methods and approaches adopted by developed and developing countries for implementing IWRM [30-31]. Integration of different sectors (industrial, domestic and agricultural) that persuade IWRM interpretations. These different kinds of integrations present extremely challenging and difficult tasks [30, 32 ,33]. IWRM has been implemented in a few developing countries, namely South Africa and Tanzania (from Africa), Pakistan and India (from Asia), and Mexico from Latin America[29]. IWRM has become undeniably one of the mainstream initiatives discussed by governments. The most important challenge remains its effective implementation in the field.

The conviction that IWRM can provide sustainable water security for every citizen into the twenty-first century has forced water professionals and IWRM to become more responsible to world citizens, especially towards the poor. The main hurdle lies in the practical implementation of the theoretically agreed-upon IWRM policies [35-36]. IWRM could be reduced to an idealistic buzzword if water

professionals fail to overcome this hurdle. The seven points discussed in this paper should be incorporated within IWRM policies and principles to overcome implementation challenges and to ensure sustainable water resources management. A practical challenge to the concept of IWRM is found at two levels. First, water is related to development and societies in countless ways. Its priorities and relative importance vary enormously from one place to another. Second, water must be seen as one factor in a broader context [34].

6. WAY FORWARD

The foregoing discussion highlighted the fluid and inconclusive discourse on IWRM in the world over. While the concept has been criticized being too advanced and not suitable for the contemporary scenarios of water resources and their management in developing economies like India, others have objected to the political economy pushing neo-liberal agenda though a backdoor entry into the large agrarian economies. A case is also being made for adapting the existing approach for watershed development, to a higher level of sub-basin, which is large enough to allow economies of scale and scope, yet not too big like a river basin, which may cut across fairly divergent agro-ecological and socio-economic scenarios hence difficult to regulate and manage. The sub-river basin approach, though not fully developed, is yet to create its legitimate place in the current discourses on IWRM in India. This paper has tried to define at least broad contours of an alternative approach, which seems to have better roots in the diagnosis as well as the present policy scenario in India. The outline presented here however, needs to be taken forward with respect to discussing the feasibility as well as its relevance to the debate on IWRM, which is far more centralized, uniform, and market oriented to address the concerns of small farmers, water scarce areas, and poor consumers. The next step therefore, is to engage with alternative perspectives to IWRM, which is more suitable, workable, welfare generating and hence desirable. In fact it may not really matter whether an alternative perspective such as the one discussed above, could be called IWRM or not so far as it has three basic features viz; process oriented, people focused, and sustainable. What is essential therefore is to initiate a constructive dialogue on what is being suggested as boundary concept, lest the otherwise promising idea may loose out for the want of a clearly defined and universally applicable notion of IWRM. In this context the National Water Policy may assume special significance in so far as it may set the tone for an informed debate on IWRM among various stake holders in different parts of the country, facing differential constraints and challenges.

Some of the important steps at this stage are to work towards a more integrated and holistic understanding on natural resources in general and water in particular. This would necessitate going beyond the departmental boundaries. This would necessitate comprehensive understanding of the ecological, socio-economic, and political realities by adopting inter-disciplinary approached, so as to define lower as well as upper-boundaries of what IWRM could achieve in medium and long run. This in turn, may call for simultaneously reviewing the major policy documents and initiatives that deal with natural resources, growth and human welfare, ecological sustainability, local governance and fiscal instruments in place. The next stage therefore, should be to initiate a public debate in the light of the received wisdom on the status of the natural resources and alternative perspectives for their management focusing on the three basic elements of an integrated approach noted above. It is high time that such a process of constructive engagement is triggered through local initiative so as to attain at least a national consensus on IWRM.

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