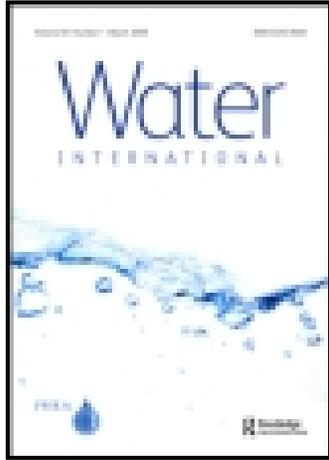


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Integrated Water Resources Management: A Reassessment

A Water Forum Contribution

Asit K. Biswas, *Past President IWRA, President, Third World Centre for Water Management, Atizapan, Mexico*

Abstract: *The concept of integrated water resources management (IWRM) has been around for some 60 years. It was rediscovered by some in the 1990s. While at a first glance, the concept of IWRM looks attractive, a deeper analysis brings out many problems, both in concept and implementation, especially for meso- to macro-scale projects. The definition of IWRM continues to be amorphous, and there is no agreement on fundamental issues like what aspects should be integrated, how, by whom, or even if such integration in a wider sense is possible. The reasons for the current popularity of the concept are analyzed, and it is argued that in the real world, the concept will be exceedingly difficult to be made operational.*

Keywords: *integrated water resources management, IWRM, water resources paradigm, efficient water management.*

Introduction

The need for water is universal. It is present everywhere, and without water, life, as we know it, will simply cease to exist. Water is constantly in motion, passing from one state to another, and from one location to another, which makes its rational planning and management a very complex and difficult task under the best of circumstances. Water may be everywhere, but its use has always been constrained in terms of availability, quantity and quality.

Water problems of the world are neither homogenous, nor constant or consistent over time. They often vary very significantly from one region to another, even within a single country, from one season to another, and also from one year to another. Solutions to water problems depend not only on water availability, but also on many other factors, among which are the processes through which water is managed, competence and capacities of the institutions that manage them, prevailing socio-political conditions that dictate water planning, development and management processes and practices, appropriateness and implementation statuses of the existing legal frameworks, availability of investment funds, social and environmental conditions of the countries concerned, levels of available and usable technology, national, regional and international perceptions, modes of governance including issues like political inter-

ferences, transparency, corruption, etc., educational and development conditions, and status, quality and relevance of research that are being conducted on the national, sub-national and local water problems.

Water is a resource that is of direct interest to the entire population, as well as to most ministries of development at central and state levels, municipalities, private sector, and non-governmental organizations (NGOs). Such widespread interest is not a unique situation for water, as some water professionals have claimed: it is equally applicable to other issues like food, energy, environment, health, communication, or transportation. All these types of issues command high levels of attention in modern societies. In an increasingly interdependent and complex world, many issues are of pervasive interest for assuring good quality of life of the people. Water is one of these important issues, but it is certainly not the only important issue.

In recent years, it has become increasingly evident that the water problems of a country can no longer be resolved by the water professionals and/or the water ministries alone. The water problems are becoming increasingly more and more interconnected with other development-related issues and also with social, economic, environmental, legal, and political factors at local and national levels and sometimes at regional and even international levels. Already, many of the water problems have already become far too complex, interconnected and large

to be handled by any one single institution, irrespective of the authority and resources given to it, technical expertise and management capacity available, level of political support, and all the good intentions (Biswas, 2001).

The current and the foreseeable trends indicate that water problems of the future will continue to become increasingly more and more complex, and will become more and more intertwined with other development sectors like agriculture, energy, industry, transportation, and communication, and with social sectors like education, environment, health, and rural or regional development. The time is fast approaching when water can no longer be viewed in isolation by one institution or any one group of professionals without explicit and simultaneous consideration of other related sectors and issues and vice versa. In fact, it can be successfully argued that the time has already come when water policies and major water-related issues should be assessed, analyzed, reviewed, and resolved within an overall societal and development context; otherwise the main objectives of water management, such as improved standard and quality of life of the people, poverty alleviation, regional and equitable income distribution, and environmental conservation cannot be achieved. One of the main questions facing the water profession is how this challenge can be successfully answered in a socially-acceptable and economically-efficient manner.

Integrated Water Resources Management

A few members of the water profession started to realize during the 1980s that the situation is not as good as they appeared. This feeling intensified during the 1990s, when many in the profession began to appreciate that the water problems have become multi-dimensional, multi-sectoral, and multi-regional and filled with multi-interests, multi-agendas, and multi-causes, and which can be resolved only through a proper multi-institutional and multi-stakeholder coordination. The issue at present, however, is not whether such a process is desirable, but rather how can this be achieved in the real world in a timely and a cost-effective manner.

Faced with such unprecedented complexities, many in the profession started to look for a new paradigm for management, which will solve the existing and the foreseeable water problems all over the world. The solution that was selected was, however, not new. It was the re-discovery of a basically more than 60-year old concept, which could not be successfully applied earlier: integrated water resources management. Many who “discovered” this concept were not aware that the “new” concept was in fact not really new, but has been around for several decades, but with a dubious record in terms of its implementation, which has never been objectively, comprehensively, and critically assessed.

Before the status of application of integrated water resources management can be discussed to make water

management more efficient, an important and fundamental issue that should first be considered is what precisely is meant by this concept. A comprehensive and objective assessment of the recent writings of the individuals and the institutions that are vigorously promoting 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 involves vary very widely.

The definition that is most often quoted at present is the one that was formulated by the Global Water Partnership (2000), which 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.”

This definition, on a first reading, appears broad, all-encompassing, and impressive. However, such lofty phrases have little practical resonance on the present, or on the future water management practices. A serious and critical look may remind one of the immortal writings of William Shakespeare:

Polonius: “What do you read, my lord?”

Hamlet: “Words, words, words.”

The question then arises is whether this well-intentional and good-sounding definition has any real meaning in terms of its application and implementation to improve existing water management, or is it just an aggregation of trendy words which collectively provides an amorphous definition which does not help water planners and managers very much in terms of actual application of the concept to solve the real life problems.

Let us consider some of the fundamental questions that the above definition raises in terms of its possible implementation in the real world, which have not been addressed to thus far:

- “promotes” – Who promotes this concept, why should it be promoted, and through what processes? Can the promotion of an amorphous concept be enough to improve water management? What about its implementation?
- “land and related resources” – What is meant by “related resources”? Does it include energy, minerals, fish, other aquatic resources, forests, environment, etc.? In terms of land and agricultural resources, the water ministry mostly has no say or jurisdiction over them. Considering the intense inter-ministerial and intra-ministerial rivalries that have always been present in all countries, how can use, development, and management of such resources be integrated, even if this was technically possible? Is this realistically feasible? If the environmental and ecosystem resources are to be considered, how can the water professionals and ministries handle such integration, which is often beyond their knowledge, expertise, and/or control? Surprisingly,

the people who formulated this definition for the Global Water Partnership are all from the water profession: experts from “land and related resources” were singularly conspicuous by their absence. What makes the water profession believe that they can superimpose their views on the other professions, who were not even consulted? Equally, why should the professionals from other professions accept the view of some people from the water profession?

- “maximize” – What specific parameters are to be maximized? What process should be used to select these parameters properly? Who will select these parameters: only water experts as was the case for the formulation of the definition, or should experts from other areas be involved? What criteria should be used to select the necessary parameters? What methodology is available at present to maximize the selected parameters reliably? Do such methodologies even exist at present? If not, can they be developed within a reasonable timeframe?
- “economic and social welfare” – What exactly is involved in terms of determining economic and social welfare? Even the economists and sociologists cannot agree as to what actually constitutes economic and social welfare, except in somewhat general and broad terms or how they can be quantified? Can water professionals “maximize economic and social welfare” in operational terms, a fact that has mostly eluded the social scientists thus far? Is it possible that even the cause-and-effect relationships between water development and management and economic and social welfare can be established, let alone be maximized? Such functional relationships are mostly unknown at present.
- “equitable” – What is precisely meant by equitable? How will this be determined operationally? Who decides what is equitable, for whom, and from what perspectives?
- “sustainability” – What is meant by sustainability, which itself is as a vague word, and also as fashionable, as integrated? How can sustainability be defined and measured in operational terms?
- “vital ecosystems” – What exactly constitutes vital ecosystems? How can “vital” and “non-vital” ecosystems be differentiated? Can even such a differentiation be made conceptually, let alone operationally? What are the minimum boundary conditions which will ensure the “sustainability” of the “vital ecosystems,” irrespective of how sustainability itself is defined, or the issue of what constitutes vital ecosystems is resolved?

When all these uncertainties and unknowns are aggregated, the only objective conclusion that can be drawn is that even though on a first reading the definition formulated by the Global Water Partnership appears impressive, it really is unusable, or unimplementable, in operational

terms. Not surprisingly, even though the rhetoric of integrated water resources management has been very strong in the various international forums during the past decade, its actual use (irrespective of what it means) has been minimal, even indiscernible in the field (for an analysis of its actual use in South and Southeast Asia, see Tortajada et al. [2004]). In fact, one can successfully argue that it would not have made any difference in enhancing the efficiencies of macro- and meso-scale water policies, programs and projects of the recent years, even if the concept of integrated water resources management had not been rediscovered and promoted vigorously during the 1990s.

For all practical purposes, the definition that has been formulated by the Global Water Partnership is unimplementable. In addition, it is internally inconsistent. Furthermore, while it uses many of the currently trendy words, it does not provide any real guidance to the water professionals as to how the concept can be used to make the existing water planning, management, and decision-making processes increasingly more and more rational, efficient and equitable.

The definition of integrated water resources management is an important consideration. When the definitional problem can be successfully resolved in an operational manner, it may be possible to translate it into measurable criteria, which can then be used to appraise the degree to which the concept of integration has been applied in a specific case, and also the overall relevance and usefulness of the concept.

In addition, a fundamental question that has never been asked, let alone answered, or for which there is no clear-cut answer at the present state of knowledge, is what are the parameters that need to be monitored to indicate that a water resources system is functioning in an integrated manner, or that a transition is about to occur from an integrated to an unintegrated stage, or vice versa, or indeed even that such a transition is occurring? In the absence of both an operational definition and measurable criteria, it is not possible to identify what constitutes an integrated water resources management at present, or how should water be managed so that the system remains inherently integrated on a long-term basis.

There is no question that in the area of water resources, integrated water resources management has become a powerful and all-embracing slogan during the past 10 years. This is in spite of the fact that operationally it has not been possible to identify a water management process that can be planned and implemented in such a way that it becomes inherently integrated however this may be defined, right from its initial planning stage and then to implementation and operational phases. For all practical purposes, most international institutions have endorsed this concept, either explicitly or implicitly. This is in spite of the facts that there is no agreement at present among the same international institutions that endorse it as to what exactly is meant by integrated water resources management, or whether it

has been possible to use this concept to improve water management practices which would not have occurred under normal circumstances, and without any explicit use of this concept, or in which countries it has been possible to apply this concept successfully; and, if so, under what conditions, over what periods, and what have been its impacts (positive, negative, and neutral) on human lives, the environment, and other appropriate development indicators; and how, or even whether, the concept can be implemented in the real world.

This type of almost universal popularity of a vague, indefinable, and un-implementable concept is not new in the area of resources management. It has happened many times in the past. During the twentieth century, many such popular concepts have come and gone, without leaving much of a footprint on how natural resources can be managed on a long-term basis. Such concepts generally became politically correct during the time of their popularity, and are vague enough for everyone to jump on the bandwagon and claim they are following the latest paradigm. In fact, it can be argued that the vagueness of a concept to a significant extent increases its popularity, since people can easily continue to do whatever they were doing before, but at the same time claim that they are following the latest paradigm.

The current popularity of the concept reminds one of another similar concept which received wide popular support in the United States during the early twentieth century: conservation. Even President Roosevelt of the United States said at that time that: “Everyone is for conservation: no matter what it means!” (Biswas, 2001). The situation is very similar in the early part of twenty-first century with integrated water resources management. To paraphrase and perhaps update President Roosevelt, one can say that “Everyone is for integrated water resources management: no matter what it means, no matter whether it can be implemented, or no matter whether it would actually improve water management processes.” The only difference between the Conservation Movement of President Roosevelt’s time and the movement on integrated water resources management of the present is that information and communication revolution and globalization processes have ensured that the gospel of integrated water resources management has been spread all over the world, and not mostly confined to the United States, as was mostly the case for the Conservation Movement earlier.

The integrated water resources management concept was promptly embraced by many international institutions during the 1990s, many of which were not even aware that it had been around for more than half a century. Thus, and perhaps not surprisingly, the authors of *Toolbox for IWRM for the Global Water Partnership* (2003) claimed erroneously that “IWRM draws its inspiration from the Dublin principles,” being blissfully unaware of the longevity of this concept, or that international institutions like the United Nations were promoting this concept extensively

during the 1950s, or the United Nations Water Conference, held in Mar del Plata, Argentina in March 1977 had more to say on IWRM (Biswas, 1978) than the so-called Dublin Conference. In addition, the Mar del Plata Conference was an intergovernmental meeting, and its Action Plan, which included integrated water resources management, was endorsed by all the governments that were members of the United Nations in 1977. In contrast, the Dublin Conference of 1992 was a meeting of experts, and thus its recommendations, whatever they were, were never approved by any government, irrespective of the claims to the contrary of the individuals and institutions that were mostly responsible for the organization of this conference.

Extensive and intensive analyses of integrated water resources management literature published during the past decade indicate two somewhat unwelcome developments. First, there is no clear understanding of what exactly integrated water resources management means. Accordingly, different people have interpreted this concept very differently, but under a very general catch-all concept of integrated water resources management. The absence of any usable and implementable definition has only compounded the vagueness of the concept and has reduced its implementation potential to a minimum. Second, because of the current popularity of the concept, some people have continued to do what they were doing in the past, but under the currently fashionable label of integrated water resources management in order to attract additional funds, or to obtain greater national and international acceptance and visibility.

An analysis of the recently-published literature on one of the definitional aspects of the concept – i.e., what are the issues that should be integrated under the IWRM level – indicates a very wide divergence of opinions. It should be noted that this refers only to what should be integrated, and not to other equally important fundamental issues like how can these issues be integrated (even can they actually be integrated since many of the issues are mutually exclusive), who will do the integration and why, what processes will be used for integration (do such processes currently exist?), or will the integration, if at all it can be done, will produce the benefits that proponents now claim. Regrettably, none of these questions are now being even seriously asked, let alone having objective and definitive answers.

Analyses of existing literature indicate that the authors concerned have considered different issues that need to be integrated under this concept. The word integration thus often has very different connotations and interpretations depending on the author(s) concerned. Depending upon the author(s), integrated water resources management means integration of:

- objectives that are not mutually exclusive (economic efficiency, regional income redistribution, environmental quality, and social welfare);
- water supply and water demand;
- surface water and groundwater;

- water quantity and water quality;
- water and land related issues;
- different types of water uses: domestic, industrial, agricultural, navigational, recreational, environmental, and hydropower generation;
- rivers, aquifers, estuaries, and coastal waters;
- water, environment, and ecosystems;
- water supply and wastewater collection, treatment, and disposal;
- macro, meso and micro water projects and programs;
- urban and rural water issues;
- water-related institutions at national, regional, municipal, and local levels;
- public and private sectors;
- government and NGOs;
- timing of water release from the reservoirs to meet domestic, industrial, agricultural, navigational, environmental, and hydropower generation needs;
- all legal and regulatory frameworks relating to water, not only directly from the water sector, but also from other sectors that have implications on the water sector;
- all economic instruments that can be used for water management;
- upstream and downstream issues and interests;
- interests of all different stakeholders;
- national, regional, and international issues;
- water projects, programs, and policies;
- policies of all different sectors that have implications for water, both in terms of quantity and quality, and also direct and indirect (sectors include agriculture, industry, energy, transportation, health, environment, education, gender, etc.);
- intra-state, interstate, and international rivers;
- bottom-up and top-down approaches;
- centralization and decentralization;
- national, state, and municipal water policies;
- national and international water policies;
- timings of water release for municipal, hydropower, agricultural, navigational, recreational, and environmental water uses;
- climatic, physical, biological, human, and environmental impacts;
- all social groups, rich and poor;
- beneficiaries of the projects and those who pay the costs;
- present and future generations;
- all gender-related issues;
- present and future technologies; and
- water development and regional development.

The above list, which is by no means comprehensive, identifies 35 sets of issues that different authors consider to be the issues that should be integrated under the aegis of integrated water resources management. Even at a conceptual level, all these 35 sets of issues that the proponents would like to be integrated, simply cannot be achieved.

These types of fundamental issues need to be dis-

cussed and resolved successfully before the concept of integrated water resources management can be holistically conceived, and then serious efforts can be made to implement it. Unfortunately, while much lip-service is given to this concept at present, most of the published works on the subject are somewhat general, or a continuation of earlier “business as usual” undertakings, but with a trendier label of integrated water resources management. If integrated water resources management is to become a reality, national and international organizations will have to address many real and complex questions, which they have not done so far in any meaningful fashion, and there are no indications that they are likely to do so in the foreseeable future. Under these circumstances, and unless the current rhetoric can be translated effectively into operational reality, integrated water resources management will remain a fashionable and trendy concept for some years, and then gradually fade away like many other similarly popular concepts of earlier times.

Popularity of the Concept

An important issue that needs to be asked is why an old concept suddenly became so popular in the 1990s, to the extent that some people and institutions now consider it to be the “holy grail” of water management? There are many reasons for its sudden leap of popularity, and only **three main reasons** will be discussed herein.

Probably the most important reason for its current popularity is the attractiveness of the concept, at least at a superficial level. In a world that operates on the principle of reductionism, integrated water resources management gives a feeling of using a comprehensive and holistic approach, which many people *a priori* assume will produce the best results, irrespective of its shortcomings and certain inherent inconsistencies. The time has come to review this aspect objectively.

Historically, it was possible for a brilliant person to know nearly all there was to know until about the end of the sixteenth century. Versatile geniuses like Aristotle, Theophrastus, Vitruvius, Isidore of Seville, and Leonardo da Vinci could discuss most subjects authoritatively. Human knowledge of natural and social sciences was at a stage where it was possible for a truly gifted person to master all the knowledge that were available during their lifetimes.

The situation started to change around the seventeenth century. By the early eighteenth century, tremendous advances in knowledge had made it impossible for any one to be a universal encyclopedist and keep up with the constant generation of new knowledge. This realization was gradually reflected in the development of a new branch of knowledge, which initially became known as natural philosophy and began to be distinguished increasingly from traditional philosophy, which was earlier considered to be the exclusive discipline for knowledge. The nineteenth century witnessed exponential advances in human knowl-

edge and, with it, technological developments. It was no longer possible for any one individual to master natural philosophy completely. Thus, new disciplines began to emerge, which further fragmented the knowledge-base to manageable levels. Natural philosophy was subsequently subdivided, initially into physics and chemistry, and later further to other disciplines like life sciences and biological sciences.

The information explosion of the twentieth century accelerated this trend of reductionism. Disciplines became more and more fragmented. It became humanly impossible for anyone to know as much there is to know even on a much more restricted subject area like water. Knowledge, communication and information revolution and increasing globalization witnessed towards the end of the twentieth century, further restricted one's disciplinary knowledge-base. With the frontiers of knowledge expanding continuously, it is becoming increasingly difficult for professionals to keep up with the advances even in their limited areas of interest.

As the world became increasingly more and more complex, the disciplinary knowledge-base of individuals started to reduce as well. People started to specialize in narrower and narrower subject areas. Concomitantly, managing human societies became more and more complex, as a result of which new institutional machineries had to be created with increasingly narrower focuses. New institutions had to be created in areas which were part of broader groups earlier. For example, in 1972, when the United Nations Conference on the Human Environment was held in Stockholm, only 11 countries had environmental machineries. Two decades later, nearly all countries of the world had similar institutions. For a variety of reasons, including efficient management, smaller institutions were preferred compared to humongous ones.

Thus, in recent centuries, a progressively reductionist approach has been applied to both knowledge and institutions. Integrated water resources management, in a sense, can be viewed as a nostalgic approach to a broader and more holistic way to manage water, as may have been possible in the past. However, since the world has moved on, water management needs to move with it.

In one sense, integrated water resources management, irrespective of the general impression prevalent in the water profession, is not holistic. This is not surprising, since most water professionals consider, at least implicitly, water to be very important, if not the most important resource. The other issues like energy, agriculture, or environment do not generally receive appropriate emphasis or consideration, though some receive comparatively more attention than others.

If integrated water resources management is considered essential by the water profession, other disciplines can justifiably promote similar concepts like integrated energy resources management, or integrated agricultural management, or integrated environmental management. Unfortunately, in a complex world, issues like water, energy, agriculture, or the environment are becoming increas-

ingly interrelated and interdependent, and thus integrated management of any one of these resources is not possible because of accelerating overlaps and inter-linkages with the other resources. Developments in the water area invariably affect management of resources like energy, agriculture, or ecosystems, and the developments in these resource areas, in turn, affect water.

Let us consider the issue of water and energy interrelationships. The water profession has mostly ignored energy, even though in many ways water and energy are closely interlinked. For example, water not only produces energy (hydropower), but also the water sector is a prodigious user of energy. Accordingly, in a country like India, hydropower account for slightly over 20 percent of electricity generated, but the water sector in turn "consumes" similar amount of India's electricity. Furthermore, no large-scale electricity production, be it thermal, nuclear, or hydro, is possible without water. In countries like France, the biggest user of water is not agriculture, but the energy industry. Thus, it simply is not possible to consider water resources management in an integrative manner without reference to energy, or integrated energy resources management without considering water. In other words, both technically and conceptually, it is not possible to consider parallel efforts which will focus exclusively on integrated management of water or energy because of their inherently extensive and intensive overlaps and inter-linkages.

Since water and energy are interrelated, consideration of integrated water resources management per se could contribute to unintegrated energy management, since these two resources have many common factors in terms of management. Both of these resources cannot be separately planned in an "integrative" manner, irrespective of how integration is defined. Optimizing the benefits of integrated water resources management, even if this can be operationally achieved by a miracle, will not result in the maximization of the benefits of integrated energy management, or vice versa. There will be trade-offs, both positive and negative, for any such management approaches for these two resources in an independently integrated manner.

One can conceivably argue that if water and energy cannot be managed in an integrative manner independently, perhaps these two resources can be managed together as integrated water and energy resources management. This is also not a practical solution because while there are significant inter-linkages between water and energy, the processes available at present for their overall management are very different, and the expertise needed to manage these two resources efficiently are also very different. Furthermore, institutionally, if these two resources are combined under one umbrella, for most countries it will result in a large and unmanageable institution, which is likely to be both undesirable and counterproductive. In a few countries, at least institutionally, water and energy are managed by the same governmental ministry. These countries, however, are comparatively small, and thus the

management of these two resources by one institution is still feasible. This, however, is not possible for large countries like China or India.

If the current global institutional arrangements for management of water and energy resources are analyzed, they are often somewhat arbitrary. For example, hydropower in some countries is placed within the mandate of the Ministry of Electricity or Energy, which means that the Ministry of Water has very limited say as to how hydropower projects are planned, operated, and managed. In some other countries, the Water Ministry is responsible for hydropower, even though hydropower contributes to a very significant percentage of national electricity generation. There is thus no simple and elegant solution. It is also interesting to note that in a country like Canada, the word "hydro" is synonymous with electricity, even though water and electricity are managed very differently, both technically and institutionally.

Irrespective of whether hydropower is located institutionally within the Ministry of Energy or Water, it is likely to contribute to the non-optimal integration of the management of these two resources. Thus, what is needed is not integration in terms of management of these two resources, but close collaboration, cooperation, and coordination between the two institutions, as well as other public and private sector institutions associated with their management. In the real world, such collaborations are unfortunately limited, and often somewhat ad-hoc. They also vary with time, even for the same country. One is reminded of Voltaire's assertion that "best is the enemy of good." The "best" solutions for integrated water management and integrated energy management may not be compatible. What we can strive for is a "good" solution which could result in acceptable management practices for both water and energy.

The problem becomes even more complex since it is not only energy sector that is closely linked to water, but also other sectors like agriculture, environment or industry. Globally, the agricultural sector is the largest user of water. Thus, neither agriculture nor water can be managed in an "integrated" way without considering the other. The issue becomes even more unmanageable if parallel efforts are made to manage water, energy, agriculture, industry, and/or environmental sectors in an integrated manner, however the word integrated is defined. Thus, integrated water resources management at a first and somewhat superficial view may appear to be a holistic approach, but on deeper consideration, it ends up as a reductionist approach, but perhaps at a somewhat higher level.

Accordingly, integrated management of a specific resource like water cannot simply be considered to be a holistic approach. One can argue that it may be possible to manage two or more natural resources by combining their management processes. Past experiences indicate that this is generally neither a practical nor efficient solution. A good example is what happened in Egypt during the 1970s when the Ministries of Irrigation and Agriculture were combined, and this combined entity was to man-

age these two sectors more rationally and efficiently than what was in the past. The Minister of Irrigation, who probably was one of the most dynamic and competent Minister of Irrigation that Egypt has had since President Nasser's Revolution in 1952, became the minister of this new enlarged institution. In spite of his heroic and strenuous efforts, it was simply not possible to manage the new Ministry efficiently or in an integrative manner. After a very short period, the management process was reversed: irrigation and agriculture became two separate ministries again. This practice has continued ever since, even though the name of the Irrigation Ministry was changed twice subsequently. Despite the name changes, this ministry has basically remained a water management institution, like in the vast majority of the other countries of the world.

In the real world, integrated water resources management, even in a limited sense, becomes difficult to achieve because of extensive turf wars, bureaucratic infighting, and legal regimes (like national constitutions) even within the management process of a single resource like water, let alone in any combined institution covering two or more ministries which have been historic rivals. In addition, the merger of such institutions produce an enormous organization that is neither easy to manage nor control.

It should also be noted that water has linkages to all development sectors and social issues like poverty alleviation and regional income redistribution. It is simply unthinkable and totally impractical to bring them under one roof in the guise of integration, irrespective of how it is defined. Such integrations are most likely to compound the complexities of the problems, instead of solving them.

Some have argued that integrated water resources management is a journey, and not a destination, and the concept provides only a road map for the journey. The problems, however, with such reasoning is that in the area of water management, we are long on road maps, but short on drivers! Equally, road maps may be useful, but in order to use them we need a starting point and a destination. Without knowing the starting point and the destination, road maps are of very limited use since one is mostly likely to be all over the place. Another problem of using a road map analogy for integrated water resources management is that we do not know where we wish to go, except in a very vague manner, and since we have no idea as to how to identify the final destination, we would have no idea when we have reached that destination, even if we reach the destination by a fluke. Not knowing the destination, it is not possible to decide if we are traveling in the right direction, or the probability of reaching the right end. In the final analysis, it is not very helpful to be long on concepts but short on their implementation potential.

There could be also some negative implications of integrated water resources management, which for the most part have not been seriously considered.

Already, in a few countries, there are indications that the main national water institution is trying to take over

other water-related institutions in the name of better integration. The implicit assumption is such integration of institutions will contribute to integrated water resources management. However, this may not be an efficient approach since different institutions have different stakeholders and interests, and this diversity is a part of any democratic process. The consolidation of institutions, in the name of integration, is likely to produce more centralization and reduced responsiveness of such institutions to the needs of the different stakeholders, which is not an objective that the present societies and international institutions prefer at present. Water management must be responsive to the needs and demands of a growing diversity of central, state and municipal institutions, user groups, private sector, NGOs, and other appropriate bodies. Concentration of authorities into one or fewer institutions could increase biases, reduce transparency, and proper scrutiny of their activities.

In addition, objectives like increased stakeholder participation, decentralization, and decision making at the lowest possible level are unlikely to promote integration, however it is defined, under most conditions, especially for meso and macro water projects.

Integrated water resources management, like similar other concepts (e.g. integrated rural development, or integrated area development) have historically run into very serious difficulties in terms of their implementation. Conceptually they could be considered to be attractive paradigms, but the world is complex, and many concepts, irrespective of their initial attractiveness and simplicity, cannot be applied to solve increasingly complex and interdependent issues and activities (Biswas and Tortajada, 2004). Even after more than half a century of existence, it has not been possible to find a practical framework that could be used for the integration of the various issues associated with water management.

Conclusions

It is argued that integrated water resources management has become a popular concept in recent years, but its application to more efficiently manage macro- and meso-scale water policies, programs, and projects has been dismal. Conceptual attraction by itself is not enough: concepts, if they are to have any validity, must be implementable to find better and more efficient solutions. This is not only not happening at present, but also there are no signs that the situation is likely to change in the foreseeable future.

It is also necessary to ask a very fundamental question: why it has not been possible to properly implement a concept that has been around for some two generations in the real world for macro- and meso-level water projects and programs? The question then arises is whether the concept of integrated water resources

management is a universal solution as its many proponents currently claim, or it is a concept that has limited implementation potential, irrespective of its conceptual attractiveness and current popularity? Unless the concept on integrated water resources management can actually be applied in the real world to demonstrably improve the existing water management practices, its current popularity and extensive endorsements by international institutions become irrelevant. Knowledge, fortunately, does not advance by consensus: if it did, we would still be living in the Dark Ages.

In addition, the world is heterogeneous, with different cultures, social norms, physical attributes, a skewed availability of renewable and non-renewable resources, investment funds, management capacities, and institutional arrangements. The systems of governance, legal frameworks, decision-making processes, and types and effectiveness of institutions often differs from one country to another in very significant ways. Accordingly, and under such diverse conditions, one fundamental question that needs to be asked is that if it is possible for single paradigm of integrated water resources management to encompass all countries, or even regions, with diverse physical, economic, social, cultural, and legal conditions? Can a single paradigm of integrated water resources management be equally valid for an economic giant like the United States, technological powerhouse like Japan, and for countries with diverse conditions as Brazil, Bhutan, or Burkino Fasso? Can a single concept be equally applicable for Asian values, African traditions, Japanese culture, Western civilization, Islamic customs, and emerging economies of Eastern Europe? Can any general paradigm be equally valid for monsoon and non-monsoon countries, deserts and very wet regions, and countries in tropical, sub-tropical, and temperate regions, with very different climate, institutional, legal, and environmental regimes? The answer most probably is likely to be no.

What is now needed is an objective, impartial and non-dogmatic assessment of the applicability of integrated water resources management. Unfortunately, most of its current promoters have *a priori* assumed that this concept will automatically make the water management processes and practices ideal. Further, the current evidences indicate that irrespective of the current popularity of the concept, its impact to improve water management has been, at best, marginal. A cynic might even say that we sit in watertight compartments, but preach holistic approaches to water management. Perhaps, the salutary caution of Harold Macmillan, the former Prime Minister of the United Kingdom, is appropriate in the current context: “After a long life I have come to the conclusion that when all of the establishment is united, it is always wrong!” Is it possible that integrated water resources management falls within this cautionary statement?

About the Author



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