



## Integrated Water Resources Management: past, present and future

### Gestion Intégrée des Ressources en Eau: passé, présent et futur

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**Abstract:** Integrated Water Resources Management (IWRM), although under different names, exists already since several decades. However facing a worldwide deterioration of the quantity and quality of the available water resources, the United Nations, followed by newly created institutions such as the World Water Council and the Global Water Partnership, put it again on international and national agendas worldwide. The present article briefly outlines this renewed view of managing water resources: A combination of institutional and structural responses, respecting Environment, Equity and Efficiency. The history of IWRM is sketched, its main critics treated and a more practitioner way of looking at IWRM with examples of Burkina Faso and Senegal is presented.

Key words: IWRM, review, theory, case studies, Burkina Faso, Senegal

**Résumé:** La Gestion Intégrée des Ressources en Eau (GIRE), bien que sous des noms différents, existe déjà depuis plusieurs décennies. Cependant, confrontées à une détérioration mondiale de la quantité et de la qualité des ressources en eau, les Nations Unies, suivies par des instituts nouvellement créés tels que le Conseil Mondial de l'Eau et le Partenariat Mondial pour l'Eau, l'ont réintégré dans des programmes internationaux et nationaux quasiment partout dans le monde. Le présent article décrit brièvement cette vision renouvelée de la gestion des ressources en eau : un ensemble de réformes institutionnelles et structurelles, respectant l'Environnement, l'Équité et l'Efficacité. L'histoire de la GIRE est esquissée, ses principales critiques sont traitées et une manière plus pratique de voir la GIRE est présentée à travers des études de cas au Burkina Faso et Sénégal.

Mots clés : GIRE, revue, théorie, études de cas, Burkina Faso, Sénégal.

## INTRODUCTION

Water resources systems are directly and indirectly affected by the interaction of numerous human related drivers of economic, social and demographic functions. Resulting often in a degradation of the quantity and quality of these water resources, giving hence rise to a myriad of tensions between users (PACIFIC INSTITUTE, 2017). On top of these often complex interactions, all the separate domains related to water resources (agriculture, energy, health, etc.) became more and more specialized over the years requiring multi-disciplinary teams. As a result, all over the world calls for a more integrated approach of water management started to rise. UNESCO (2009) started promoting a user-friendly and cooperative approach as an alternative to the previous activities of individual water using sectors acting in their own interest, with very little interaction with one another. The Global Water Partnership (GWP) became an official ambassador of the promotion of Integrated Water Resources Management (IWRM). They were the first to launch a definition of IWRM in 2000 (GWP, 2000) and updated it in 2017: *“Integrated water management is based on the equitable and efficient management and sustainable use of water and recognizes that water is an integral part of the ecosystem, a natural resource, and a social and economic good, whose quantity and quality determine the nature of its utilization”* (GWP, 2017).

The present article briefly outlines this view of regarding and managing water (and land and its related resources, (GWP, 2000)) as a social, economic and environmental good; all three considered equally important. The history of IWRM is sketched, its main critics treated and a more practitioner way of looking at IWRM with examples of Burkina Faso and Senegal is presented.

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## INSTITUTIONAL HISTORY

As from around late 1970, the quantitative and qualitative state of the world's water resources became a national and international political priority. However during the first following decades, the focus mainly went to water, sanitation and hygiene (WASH), and access to water for all. From the 90s on, it expanded spectacularly towards a governance and management policy integrating respect for environment and sustainable development. In this framework, several international conferences were organized and new institutions created; such as the Global Water Partnership and the World Water Council.

The 1977 UN Conference (one of many) on Water in Mar del Plata, Argentina, remains the only global government meeting to focus solely on water matters and was endorsed by the 116 governments present (WOODHOUSE & MULLER, 2017). The Mar del Plata conference stated that the *“accelerated development and orderly development and orderly administration of water resources constitute a key factor in efforts to improve the economic and social conditions of mankind”* and *“it will not be possible to ensure a better quality of life and promote human dignity and happiness unless specific and concerted action is taken to find solutions and to apply them at the national, regional and international levels”* (UN, 1977). In practice, nothing much happened until 1992, a preparatory “International Conference on Water and the Environment” (ICWE) brought together experts and professionals in Dublin. Its outcomes are the now worldwide known and accepted “Dublin Principles” (ICWE, 1992):

- 1) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- 2) Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- 3) Women play a central part in the provision, management and safeguarding of water.
- 4) Water has an economic value in all its competing uses and should be recognized as an economic good.

Highly criticized for its neo-liberal stance considering water as an economic good, the 1992 United Nations Conference on Environment and Development (UNCED) tried to reconcile this concern during the Rio “Earth Summit”. The adopted Agenda 21 (chapter 18) stated that water resources management should consider *“water as an integral part of the ecosystem, a natural resource and a social and economic good ... and using water resources priority has to be given to the satisfaction of human need and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately”* (UN, 1992).

However, it was not Agenda 21, but ICWE's “Dublin Principles” which had the greater impact over the following decades, driven by the establishment of the World Water Council (WWC) and the Global Water Partnership (GWP), both institutes explicitly committed to the promotion of the Dublin Principles (WOODHOUSE & MULLER, 2017). The major roles, played by the UN in the past, have now been taken over by the World Water Council and the Global Water Partnership (BISWAS, 2004a).

The World Water Council is a multi-lateral platform aiming to increase decision-makers' awareness and promote sustainable development. The WWC organizes, amongst others, triennial World Water Forums (WWF) to promote its vision: Marrakech (Morocco), 1997; The Hague (The Netherlands), 2000; Kyoto (Japan), 2003; Mexico City (Mexico), 2006; Istanbul (Turkey), 2009; Marseille (France), 2012; Daegu (South Korea), 2015. Dakar (Senegal) will host the World Water Forum in 2021. The Global Water Partnership, created in 1996 by the World Bank, UNDP and SIDA (Swedish International Development Agency), represents all water related actors, public and private. Its mission is to assist countries in the sustainable development of its water resources by promoting exchanges of information and know-how on integrated water management. GWP proposes a single definition combining the Dublin Principles presented above. Recently the UN picked up IWRM again in the elaboration of their Sustainable Development Goals (SDG); global goals to be reached by 2030 (UN, 2015). The Sustainable Development Goals broaden the scope of discussion from the Millennium Development Goals' (MDG) on drinking water to an unambiguous endorsement of integrated water management (SDG 6.5). Sustainable Development Goal 17 also addresses the governance dimension, thereby filling a critical gap in the MDGs by seeking *“to develop effective, accountable and transparent institutions at all levels”* (SDG 16.6) and *“to ensure responsive, inclusive, participatory and representative decision making at all levels”* (SDG 16.7) (RONCOLI *et al.*, 2016). In this broader action framework, IWRM is also recognized as a tool in the reduction of poverty. IWRM is today more than ever on the foreground of sustainable development.

## CRITICS

There exists however also some critical voices on IWRM. The definition of GWP is impressive and holistic but hardly implementable in operational terms (BISWAS, 2004b). The ambiguity of the concept and the vagueness/vastness of the framework were sometimes used to promote market-based instruments and stress the ideological orientation of its promoters (PETIT & BARON, 2009); e.g. supporters of privatization will principally promote the economic value principle, and social activists will mainly stress the equity.

It also seems that IWRM holds almost a monopoly in global water management. Either, each success story in the domain of water or related natural resources management receives quickly the label of IWRM. On the other hand, alternative thinking on pragmatic water management solutions is often shut out (GIORDANO & SHAH, 2014). IWRM gives a feeling of using a comprehensive and holistic approach, which many people a priori assume will produce the best results (BISWAS, 2004b); since all domains are supposedly included, no solution is believed to be left out.

WOODHOUSE & MULLER (2017) state that IWRM has often become an end in itself rather than a means to solve specific challenges. While it is argued that IWRM “*is not an end itself but a means*”, several financial institutes prioritize those projects that comply with national policies that are based on the concept of IWRM (PETIT, 2016). The means has become an end. While plenty examples exist on the successful reforms of institutional structures and legislative texts (GWP, 2006), the efficiency or the progress of the reforms are seldom evaluated (PETIT & BARON, 2009). Comparative or standardized evaluations are hard to carry out since it is not possible to develop a generic and overall description of IWRM strategies and techniques, it is necessary to adapt the IWRM concept to suit different local contexts (PETIT, 2016).

Recently, more and more voices are demanding a water-food-energy nexus approach (ALLAN *et al.*, 2015). Food and energy supply chains, heavily dependable on water resources, are often impacted by subsidies that are of vital significance; hence influencing economy and trade. There are prices for food and energy (subsidized or not), but not for the water in food and energy. A nexus approach, including these more ‘downstream’ food and energy suppliers, can allow e.g. for the integration of trade and such subsidies in IWRM (AL-SAIDI, 2017; WOODHOUSE & MULLER, 2017).

## IWRM IN PRACTICE

Addressing the IWRM challenges usually needs responses in two key areas: responses that address structural issues, including data acquisition, infrastructure and operations and maintenance; and institutional responses (often called ‘soft’ interventions) that cover issues such as policies and pricing, or knowledge and information. Both kinds of responses are important and inter-related (GWP and INBO<sup>6</sup>, 2009).

### Institutional responses

Concerns about the state of water resources are real and technical solutions exist. However, the problems are initially institutional (2iE, 2010; RONCOLI *et al.*, 2016; WORLD RESOURCES INSTITUTE, 2017). An IWRM approach should therefore follow the Dublin principles and build a three-dimensional framework (Figure 1):

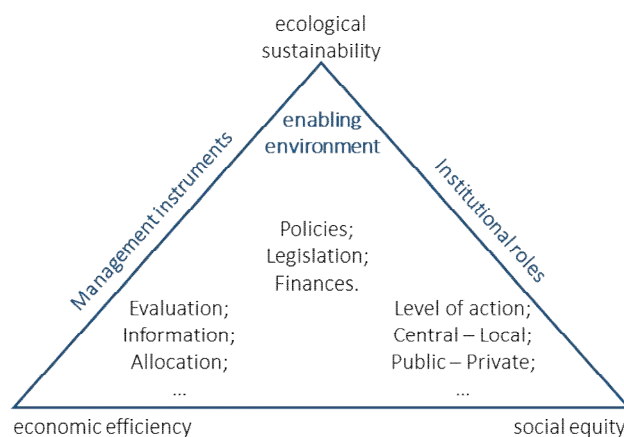
- An enabling environment of suitable policies, strategies and legislation for sustainable water resources development and management that will provide legal status to government water management institutions and water user groups; that will ensure the sustainable use of water; encourage the creation of financing mechanisms and incentives to allocate financial resources to meet water need, etc.
- An institutional framework through which to put into practice the policies, strategies and legislation: establish organizational structures at basin and sub-basin levels to enable decision-making at the lowest appropriate level; elaborate an institutional arrangement for the operation of a consortium of stakeholders representative for all sections of society and with a good gender balance, etc.
- Management instruments required by these institutions to do their job: IWRM plans; a monitoring and evaluation service to understand water availability and needs; a demand management mechanism that allows regulation and allocation of water resources; economic instruments in order to evaluate the value and price of water, and information management mechanism to improve knowledge for better water management, etc.

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<sup>6</sup> International Network of Basin Organizations

In short: Water must be considered as an *economic, social and environmental* good. Governments should facilitate and enable the sustainable management of water resources, in particular through the creation of an *enabling environment* (legal and regulatory framework, institutional and financial framework). Water policies should focus on water *management*, not just on production. Water resources must be managed at the lowest possible level (*subsidiarity principle*); but also recognized at as well national, regional and local level. *Women* play a central role.

This approach is also graphically presented in Figure 1 (based on 2iE<sup>7</sup>, 2010). The 3 cornerstones of the triangle are also the 3 IWRM cornerstones (or the 3 E's): **E**cological sustainability, social **E**quity and **E**conomic efficiency. The enabling environment, put into place by the government, dictates the “rules of the game” and prevent the triangle from collapsing. The institutional framework identifies “the players” and their respective responsibilities (e.g. roles and responsibilities of local vs. central structures, roles and obligations that could be attributed to the private sector, etc.). As for the management instruments, they represent the “players” with their competences and know-how needed to play a fair and efficient game, in harmony with the social and economic context (e.g. evaluating and monitoring natural resources, disseminating valued information, and regulating an efficient and equal water distribution, etc.). For a successful IWRM plan all elements in the triangle should be met; if some elements are missing, targeted actions must be carried out (see also GWP IWRM Toolbox (GWP, 2017)).



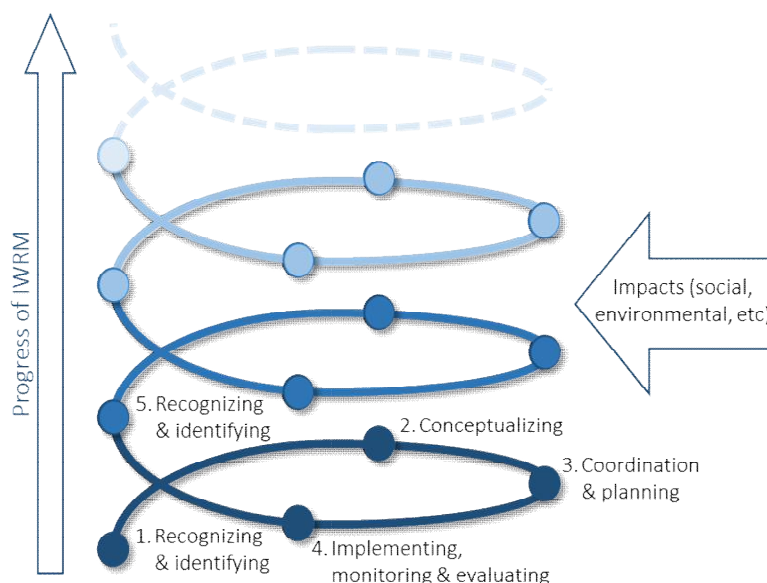
**Figure 1** – IWRM’s three-dimensional framework (based on 2iE, 2010)

### ***Structural responses***

Planning and executing IWRM is an iterative, evolutionary and adaptive process, conceptualized as a ‘spiral’, which permits immediate action, builds understanding, develops local capacity and creates ownership (Figure 2). It is an open-ended process that evolves in a spiral manner over time as one moves towards more coordinated water resources management (UNESCO, 2009). The first step begins with recognizing and/or identifying a need for IWRM (*step 1*). The second stage is to grasp the overall picture of the water resources and its users (conceptualizing) (*step 2*). Once the understanding and objective of the actual and future situation are clear (*step 3*), planning and coordination can start (*step 4*). During the implementation of the action plan, monitoring and evaluating activities (*step 4*) should be included in order to change the action plan when needed (e.g. arrival of new water users) (*step 5*). The advantages of this spiral way of looking is that it promotes cooperation and integration, and the pursuit of better solutions at each turn of the spiral that adapt to changing circumstances and values. Any basin management can restart its own IWRM by orienting itself to the nearest position in the ‘spiral’.

In practice, this cycle may be interrupted by external forces, but the ‘learning-by-doing management cycle’ helps to incorporate lessons learned in the process of planning and managing water and take into account new information as it comes to hand (e.g. political changes, natural catastrophes, changes in demography, new technologies) (GWP & INBO, 2009). A well operating basin committee, will also be more resilient and adaptive to these external impacts.

<sup>7</sup> Institut International de l’Eau et de l’Environnement



**Figure 2 – IWRM Spiral and Process (based on UNESCO, 2009)**

### FROM SPONTANEOUS TO INSTITUTIONAL AND BACK

There is no set of fixed rules to implement an IWRM plan. However, several well documented road books exist (GWP and INBO, 2009; UNESCO, 2009; 2iE, 2010) and a vast toolbox elaborated by GWP (GWP, 2017) from which governments and IWRM practitioners can pick advices. The following two short examples of Burkina Faso and Senegal give an idea of different approaches and experiences in IWRM.

#### **Burkina Faso: from bottom to top and back**

The Kou watershed, in the South-western part of Burkina Faso, has for several decades faced various forms of conflict often encountered in irrigated areas. The watershed houses the second largest town of Burkina Faso (Bobo-Dioulasso), a formerly state-run rice irrigation perimeter and a myriad of small holder irrigated farms planted anarchically along its major perennial water courses. In spite of an abundance of water, most water users face chronic water shortages due to an increase in population, industrial activities and irrigated agriculture. At the demand of the concerned users, political and administrative authorities created in 1987 a ‘makeshift’ Kou Basin Management Committee to address the threads resulting from situation (WELLENS, 2008). In 1999 its first 5-Year Priority Actions Plan was adopted. Results were mitigated; however its main success are i) a raise in the drinking water distribution network from 71% to 86% and ii) a protective perimeter area was installed around the basins main sources (‘la Guinguette’). Voluntary subscriptions fees, to finance the Committee’s activities, were discussed but proved impossible to put into practice. Lack of finances and administrative instability through multiple changes in ministries put the Committee in a waking state for several years.

It was not until 2008, through the impetus given by the State within the framework of decentralized IWRM policy (GWP, 2009) that a Local Water Committee (LWC) was created, building from the ‘makeshift’ Committee’s experiences. No longer a ‘makeshift’ construction, the new Committee has a solid institutional anchorage. It is composed of representatives from civil service, territorial communities, users, civil society, NGOs and the occasional users. A new priority action plan was elaborated and financed by negotiated users fees (WELLENS *et al.*, 2013a, 2013b), and concentrates in a first time on an improved understanding (WELLENS, 2014) and protection of the available water resources: e.g. planting of trees to restore and protect river banks (LEFASO.NET, 2016), anti-pollution controls by the ‘water police’ (LEFASO.NET, 2017). To guarantee its fluid organization and functioning, an ad hoc committee, including mainly civil society, was installed within the LWC.

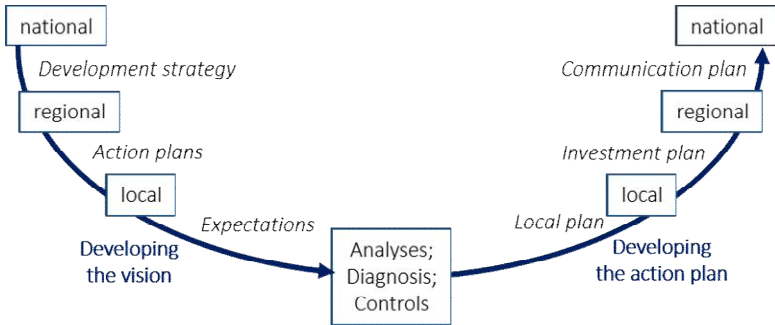
The lessons from the Kou basin experience learn that a grassroots movement alone, despite the motivation of its drivers, is often not enough for an operational and sustainable IWRM. In this case the *structural responses* were hampered by a delay in *institutional responses*. An enabling environment, installed and guarded by the State, legitimizes and hence empowers the ambitions of local water committees. It is also important to note how

the State valued the spontaneous initiative of the ‘makeshift’ committee and helped it to convert into its present Kou Basin Local Water Committee; in such a way reviving the ‘spiral’ momentum.

**Senegal: from top to bottom and back**

Senegal is less decentralized than Burkina Faso. As a consequence the implementation and translation of the national IWRM action plan (DGPRES, 2007) into local IWRM action plans is more top-down driven; but nevertheless respecting the Dublin principles.

The planning process is a result of concertations between actors broken down into 2 movements: the double planning principle (Figure 3) (PEPAM, 2014). Based on existing national and/or regional development plans, a diagnosis phase is carried out from national to local level. The national development plan establishes the framework within which specific actions to improve water management should be inscribed. The diagnosis contains a state of the art of the actual water resources and its users, and defines national expectations of the future local action plans. Then from the local to national level, local action plans are elaborated by the concerned actors themselves; taking into account, in a very detailed way, short- and medium-term expectations and local capacities.



**Figure 3** – Actors participation following the double planning principle (PEPAM, 2014)

At the moment of writing, regional action plans are available for the Niayes (DGPRES, 2014) and Bas Ferlo (DGPRES, 2016) zones. Since adaptations to local action plans have just been launched, it is impossible to evaluate the success of this approach. Nevertheless, the lesson to be learned from the Senegal case is that the implementation of local actions plan can follow different approaches and based on national characteristics, in this case the very centralized state of Senegal, adaptations are made. At the same time the IWRM basic rules were respected: participation of all actors (Figure 3) and economic sustainability (e.g. investment plan in Figure 3).

**CONCLUSION**

Integrated Water Resources Management, although under different names, exists already for several decades. However the United Nations, followed by the World Water Council and the Global Water Partnership, put it on top of the international and nearly all national political agendas since the 1980s. Since then considerable efforts have been made to define and guide the implementation of IWRM: the Dublin principles, the GWP definition and more recently the UN’s Sustainable Development Goals. With time, the Dublin principles as well as the GWP definition, considered too vast to be feasibly applicable on the terrain, were amended with more practitioner visions. A combination of institutional and structural responses, respecting the Dublin principles (sustainable Environment, social Equity and economic Efficiency), is now most often encountered in recent IWRM plans. Each country is free to give its own interpretation, based on its national characteristics: from grassroots movements to centrally institutionally recognized basin management committees in Burkina Faso or starting from a centrally guided implementation in Senegal. With the integration of IWRM in the UN’s Sustainable Development Goals, IWRM is now more than ever firmly on top of the agendas as a tool to fight poverty and promote sustainable development.

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