

Chapter 11

“Greening” Integrated Water Resources Management Policies for Tackling Climate Change Impacts: A Call for Sustainable Development

Nazmul Huq and Jean Hugé

Abstract This paper is a conceptual analysis of how “green” Integrated Water Resources Management (IWRM) can be the key to sustainable social and economic development under the regime of climate change. The prevailing IWRM principles developed by the Dublin and Rio statements (1992), the Millennium Assembly (2000) and the WSSD (2002) attach a narrow, technical and single purposive orientation to IWRM, which are inadequate in fighting against the impact of climate change. Standing on the brink of irreversible impacts of climate change, it is now most urgent to secure the water sector from the devastating impacts of climate change by appropriate responses through policies and acting accordingly. Integrating a climate-proofing approach to IWRM policies is termed as “green” IWRM. Analysis emphasizes that only “green” IWRM can promote water security under the changing climate. The paper outlines the strategies that should be taken to make the IWRM “green”, which will further ensure sustainable use of freshwater, participation, gender balancing and equitable and efficient management fostering sustainable development.

Keywords Adaptation · Climate change · Greening · IWRM · Policies

N. Huq (✉) · J. Hugé
Bangladesh Centre for Advanced Studies, House 10,
Road 16A, Gulshan-1, Dhaka 1212, Bangladesh
e-mail: nazmulhuqrussell@gmail.com

Introduction

The word “crisis” is sometimes overused in development. But when it comes to water, there is a growing recognition that the world faces a crisis that, left unchecked, will derail progress towards the Millennium Development Goals (MDGs) and hold back human development (UN-DESA 2008). Throughout human history, progress has depended on access to clean water and on the ability for societies to harness the potential of water as a productive resource. Water for life in the household and water for livelihoods through production are two of the foundations for human development identified by the United Nations Development Programme Human Development Report of 2006 (UNDP 2006).

Climate change is arguably the most severe long-term threat to development facing this and future generations (Adger et al. 2003; Klein et al. 2008). By altering the hydrological cycle, climate change will exacerbate the water management problems that countries already face. Climate change will have significant, often dramatic, consequences: higher sea levels, more variable rainfall, more frequent and intense floods and droughts, and rapid desertification (GWP 2009). The consequences of water sector vulnerabilities for climate change are posing fundamental challenges to achieving the development aspirations. Water is already a scarce resource for reasons not directly associated to climate change: burgeoning population, excessive groundwater extraction, and industrial pollution, among others. Projections of the impact of climate change suggest that it would further exacerbate the water stress felt in many places around the world. As the causes of water quality and quantity deterioration become increasingly climate-challenged, it will be a daunting challenge for policy-makers to attribute responsibility to specific stakeholders for taking corrective action (David and Pandya 2009).

Better water management is thus essential for us to adapt to climate-induced changes in water resources. The future resilience (or vulnerability) of human communities to climate change-related impacts will depend on their success (Slootweg 2009; Bates et al. 2008). Since the early 1990s, the Integrated Water Resources Management (IWRM) concept has been emerging in the sustainable development and water resources management context. IWRM is perceived as the best approach to manage water resources in an efficient, equitable and sustainable manner.

Climate change and its devastating impacts are approaching at such a rapid pace that policy reconfiguration is urgently needed. The existing policies, for example the National Development Plan (NDP), land use, water use, transportation, forestry, agriculture, biodiversity and demography, etc., are all being readjusted to fight against climate change. Those readjustments are the necessary responses against the impacts of climate change (Eriksen et al. 2007; Klein 2008; Parry 2009). IWRM is regarded as the most effective approach for managing valuable water resources, but it also needs to be reorganized and readjusted to develop an equal interface against impending climate change impacts. This approach is identified as “greening” IWRM. The paper argues that the existing IWRM

principle should be modified according to the response against climate change impacts in such a way that it would be responsive and provide an effective solution to global warming impacts.

Concept of IWRM

IWRM is an approach as well as a philosophy to support decision-making for managing complexity in the water sector. Water is the most scarce and valuable resource in the world; it is predicted that by 2025 around 3 billion people will be living under a water-stressed situation (GWP 2009). Global environmental changes add an additional burden on the water sectors. Since early 1990, environmental conventions adopted an integrated approach to manage scarce water resources in a coordinated manner for better use, which includes the allocation among competing human activities (Slootweg 2009). The Rio Earth Summit in 1992 is the major blow to push the IWRM concept embedded into policy and practice. In the twentyfirst century, IWRM has been widely accepted for the water management regime (Jonker 2007). The approach has been defined and conceptualized from academic, research and field experiences. The true meaning of IWRM is very much oriented to sustainable livelihood promotion through efficient uses of water resources.

Jonker (2007) and Merrey et al. (2005) describe IWRM from a livelihood point of view. They view the whole approach as a paradigm shift of traditional sectoral water resources management to an integrated manner where efficient management, allocation of water resources, sustainability of the water resources and support to human activities on the basis of equity are key. IWRM is a framework within which to manage people’s activities in such a manner that it improves their livelihoods without disrupting the water cycle (Merrey et al. 2005; Jonker 2007).

The Global Water Partnership (GWP) defines the IWRM concept from the same point of view with some additional complements and components to make it functional into working for the practitioners (GWP 2009; Slootweg 2009). They take the essence of defining its guiding principles from the Dublin and Rio statements (1992), from the Millennium Assembly (2000), which gave rise to the Millennium Development Goals, and from the World Summit on Sustainable Development (2002) Plan of Action, which set a target for the preparation of IWRM and Water Efficiency plans. The guiding principles are:

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

It also describes IWRM as: “Integrated water resources management is based on the equitable and efficient management and sustainable use of water and recognises 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 utilisation” (GWP 2009).

Different views allow us to understand what an IWRM approach can offer for sustainable and efficient use of scarce water resources and for the betterment of humans and the planet. It can be summarized that IWRM is not just about managing physical resources; it is also about reforming human systems to enable all people to benefit from those resources.

IWRM and Climate Change

The impacts of climate change on the water sector are not linear; rather they are most complicated with multilevel interconnected impacts on society, community and ecosystems. Sea level rising, floods, lowering groundwater table, shortage of irrigation water, etc. will invoke settlement loss, crop damage, diseases, food insecurity, malnutrition, income loss and more poverty. The most threatening aspect is that the whole development track will lag behind the target. According to the recent MDG progress report, development targets cannot meet the expected targets, especially for low income countries (Eriksen et al. 2007; Klein et al. 2008; Parry 2009). Numerous reports, studies and researches establish the fact that impacts of climate change are playing the major role for this development apartheid. MDG target No. 3 of goal No. 7 clearly states that “Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation”. The crude reality of MDG goal No. 7 was shown to be that in 2009 already about 1.6 billion of the world’s poor people were denied access to water and, by 2025, more than 2 billion will be added to this number (UN 2008). The majority of the water-stressed people will be the silent victims of climate change.

In this context, the challenges of water management will become increasingly important because there is general agreement that the supply of and demand for water resources will be substantially affected by climate change. The first key message is that, if the global energy habits are the focus for mitigation, the way of using and managing the water must become the focus for adaptation. One reason for this is that it is widely predicted that relatively small temperature changes of a few degrees will see average river flows and water availability increase by 10–40% in some regions while, in others, they will decrease by 10–30% (GWP 2005; Slootweg 2009). A further message is thus that changes in climate will be amplified in the water environment. The best approach to manage the impact of climate change on water is that guided by the philosophy and methodology of IWRM. The principles proposed by the IWRM methodology are based on equity-based efficient and effective management of the water resources and those principles are very much synergetic with the very core notion of sustainable development.

If the challenges of climate change for the world’s water are not understood and addressed, the risk exists that the water supplies provided to the communities of a growing, urbanizing world, the infrastructures built to serve them and the industries and agriculture that supply and feed them will prove to be unsustainable (IFPRI 2009; Pahl-Wostl 2007). There are also broader dangers. If we fail to understand the interaction between climate change and water, other climate change strategies may actually aggravate the problems and increase the vulnerability of communities to both natural and man-made calamities (GWP 2005).

IWRM can be instrumental for both mitigation and adaptation strategies to climate change impacts if properly materialized. IWRM can play a vital role in mitigating the water-stressed climatic hazards, e.g. floods, lowering groundwater table, irrigation crisis and water-based livelihood vulnerabilities such as fishing. Effective planning to use IWRM for mitigating water-stressed hazards can eventually contribute to the holistic adaptation process and environmental sustainability that will boost the overall development trajectory especially to meet the MDG targets.

Greening IWRM: A Demand of the Time

Why “Greening IWRM”?

Policy greening is now one of the most oft-repeated pieces of jargon in policy domain. The unprecedented rate of climate change puts a strong impetus on greening the policies for all sectors. “Greening” refers to cross-cutting integration of principles in policies, plans and programmes. By nature, “greening” itself suggests a classical ecological focus and environmental sustainability (Hugé and Hens 2009). Encouraged by the essence of environmental sustainability, the paradigm has been shifted from “environmental policy greening” to “climate policy greening”. As long as climate change impacts are concerned, the term “greening” also bears the synonymous explanation of the concepts “climate integration”, “climate mainstreaming” and “climate proofing” (Klein 2008; Ahmad 2009). For climate change, it refers to the integration of climate-related vulnerabilities and mitigation and adaptation techniques into policies so that policy itself can be climate-resilient and when policies are put into action, those actions will also be climate-proof. It entails the whole spectrum of the penetration of climate resilient policies.

What is Green IWRM?

As a subset of climate policy, water policies also deserve to be “green” for better climate resilience. IWRM is an already established idea, concept and philosophy for managing water sustainably with special attention to environmental sustainability. However, to tackle the adverse impacts on the water sector and related

cross-cutting sectors, it is time to make another paradigm shift with “green IWRM”. “Green IWRM” refers to the concept of cross-cutting integration of climate policies into major policies, programmes and actions related to IWRM. It also refers to the fact that the fundamental principles of IWRM would be embedded with policies and actions related to the fight against climate change.

The Global Water Partnership (2009) acknowledges that the prevailing mindset on water by promoting and applying the Integrated Water Resources Management (IWRM) approach is not enough for adaptation and mitigation for climate action. So far, IWRM is characterized by some overwhelming features such as narrow scope of implementation, more technical orientation, lack of capabilities of dealing with versatile issues, and being purpose-specific. So far, 68% of developed countries and 38% of developing countries have implemented IWRM but none of them use “outside the box” thinking to deal with the multi-dimensional complexities that are imposed by climate change (Jonker 2007; Mazvimavi et al. 2008; GWP 2009), although, in principle it is supposed to be efficient, effective, sustainable and equitable in nature. This fundamental lacking of existing IWRM raised the need to embrace IWRM with the principle of “green” that can effectively work for the sustainability of the water sector under a changing climate, keeping the human development as the most instrumental guiding principle (Merrey et al. 2005).

“Green IWRM” promotes a holistic approach to water management and recognizes that there are multiple pathways to building resilience against climate change. The methodology seeks to identify, and then to achieve trade-offs between, different water management objectives, including environmental sustainability, economic efficiency and social equity. It encourages the structured engagement of communities and sectors impacted upon by water into its management both to seek and promote “win–win” solutions but also to ensure that a better understanding of water constraints and challenges is developed and diffused into the society (GWP 2005).

Greening IWRM: A Process Approach

The strength of IWRM lies in its strong roots in the water sector and its subsequent extensive theoretical and practical knowledge of water-related issues. At the same time, this sectoral basis can be a point of weakness when issues beyond the sectoral boundaries have to be addressed. This has resulted in a call to think “outside the box”, to see beyond what is common practice within the sector. In everyday practice, however, IWRM is not always effective in addressing the climate change adaptation challenge. In order to develop IWRM more effectively and responsively, various sources have suggested the linking of IWRM with Strategic Environmental Assessment (SEA) (Slootweg 2009).

The literatures suggest that in making IWRM climate-responsive, different steps can be followed. One of the processes is taking such an approach that will

make convergence of different far-ended approaches into a single policy. The ingredients of this approach are as follows (UNESCO 2009; GWP 2009; Parry 2009; Slootweg 2009):

- A systems approach: assesses the linkages between, for example, humans and nature, water and the land, and the local and national perspective.
- An integrated approach: provides for a more coordinated and managed approach looking at the catchment and coastal level and surface and groundwater.
- A managed approach: strives to maximize water resources, minimize negative impacts and balance supply and demand.
- The stakeholder approach: examines the need for participatory decision-making at all levels, e.g. from government to individual. This will lead to a partnership approach and a sharing of common objectives.

Finally, the sustainable approach will focus on the necessity for equitable access to water resources. There are often compromises to be made between protection and use. This last thought appears to be a key one. To ensure water sector sustainability, there must be a balance between protection and rational use of the water. Different tools can be applied to bring the balance, such as developing policies and strict enforcement which, for instance, different countries have developed without significant tangible improvement (World Bank 2009a). However, practitioners suggest that improved basin management, community dialogue, trans-boundary cooperation, user sensitivity and attitudinal changes towards the precious water resource can bring prosperous development for bringing balance in protection and use. Moreover, more government attention, research and consensus among the stakeholders are deemed necessary (Cap-Net 2005; UNDP 2006; Cap-Net 2009).

Cap-Net (2005) also suggests a different approach for preparing IWRM which follows a sequential and cyclical approach. In this approach, there is plenty of space available to insert climate-proofing policies to make the IWRM green. The process approach suggested by the Cap-Net are as follows, showing the possible spaces to incorporate climate resilience policies.

Figure 1 shows a simple diagram of IWRM planning cycle. This is a very orthodox approach used for developing IWRM planning. To make it climate-proof and “green”, some components can be added in each section of this cycle (Cap-Net 2005; Cap-Net 2009).

In the “Initiation” step, climate change impacts need to be integrated in the planning process. In advocacy towards policy-makers, the argument can be brought up that this will be instrumental for decision-makers to advance demand management strategies, which otherwise might be politically difficult to implement.

During the “Vision/Policy” phase, climate change adaptation is an additional element, not a replacement of IWRM goals. The overall aims of IWRM will remain the same.

In the “Situation Analysis” step, the use of climate information and impact analysis needs to be incorporated. Further, the adaptation/mitigation theme can be

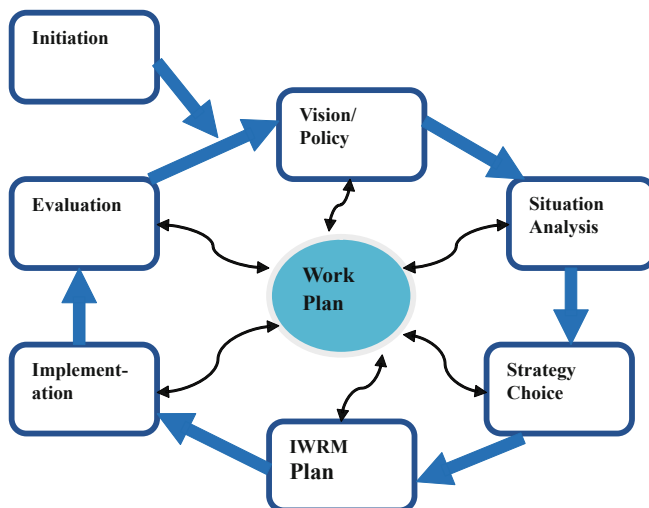


Fig. 1 The IWRM planning cycle. Source: Adapted from Cap-Net (2005)

brought out to suggest that the IWRM process should reduce the risk of adaptation options negatively impacting on the mitigation targets, and vice versa.

In the “Strategy Choice” phase, the anticipatory or “precautionary” approach can be introduced as the basis for strategies for IWRM.

Consider the roles of local authorities in adaptation strategies when drafting an IWRM plan. Legal frameworks, economics and health, and other variable conditional elements that have been analysed from the cornerstone for implementation of IWRM are decisive in how it contributes to climate change adaptation.

During evaluation, results must be measured against indicators, taking into consideration the adaptation measures proposed in the plan.

Throughout the process, stakeholder involvement is essential so that the results of the impacts assessment and strategic choice are owned by the implementing agencies.

The “greening” process of IWRM is not an easy one to implement. As stated earlier, so far only 68% of developed countries and 38% of developing countries have their IWRM plan. Studies conducted by Kramer (2007), Hugé and Hens (2007) on PRSP show that national development plans of developing countries are not green in principle to tackle environmental disasters, let alone IWRM. Klein (2008) conducted another portfolio study of ODA-funded projects and finds most donor-funded projects are not climate-proofed. In these circumstances, it is not easy to incorporate the greening policies into IWRM. Moreover, the developing countries who will be the first victims of climate change have a very low level of awareness in their policy level. The institutional strength is not enough to develop such realistic policies that will comply with the needs to tackle the climate stresses.

Greening IWRM: The Case of Bangladesh

Bangladesh, considered one of the most vulnerable countries to climate change impacts, is suffering tremendous water-related problems initiated by climate change (Ahmed 2006). Bangladesh recently prepared three documents related to water use, the National Water Policy 1999, National Water Management Plan 2005 and Poverty Reduction Strategy Paper 2008. All three documents, especially the first two, exclusively deal with the rational use of water resources and are based on the idea of traditional IWRM. It is a matter of great concern that despite inclusion of all of the aspirations of IWRM, those policies cannot make a proper response to the climate change problem. The detailed analysis reveals the truth that even though IWRM philosophy was the cornerstone of these policies, they are not enough to tackle the adverse impacts of climate change (GED 2008). As a result, countries’ aspiration towards sustainable development and the positive achievements towards development are seriously at stake. Agricultural production is going down, livelihoods are becoming vulnerable and acute shortage of drinking water has gradually surfaced (MoEF 2008). This evidence suggests that IWRM policies need to be shifted towards a green policy, where climate-proofing development would be ensured. The ministry should take the lead to save the countries’ most vulnerable resources and coordinate the efforts that are being taken to reduce the vulnerabilities from climate change impacts. For better response to the impacts of climate change there is no alternative than to go for “climate-proofing” development, which can be started from preparing climate-proofing action plans and policies and acting accordingly. It is thus necessary to incorporate the basic principles of developing climate-proof policies into action. If not, all the development efforts might go in vain. From this aspiration, it is time, albeit rather late, to start making the development and management of the water sector “climate proof”, developing “green” IWRM and inserting the policy as a cross-cutting issue in all development intervention.

Conclusion

The whole discussion is aimed at developing the consensus that the present common interpretation of IWRM is not sufficiently compatible to fight against climate catastrophe. Much more comprehensive policies have to be developed which will be green in nature and sufficiently capable to face climate change effectively. At the same time, it is equally necessary to recognize that to make this paradigm shift, the core values of IWRM cannot be erased. IWRM is the best possible solution that works for sustainable use of scarce vital water resources. Thus, it is an urgent call to make “green” IWRM policy that will hold its core components at its centre and save the water resources for the people and ecosystem of the planet. However, most importantly political reluctance, lack of awareness and economic hindrance are working against stimuli for a green IWRM. As long as

sustainable development is the dream, making efficient and equitable use of water based on the philosophy is of the utmost importance. IWRM policies thus should be directed towards accommodation of green policies so that climate-proofing notions can be ensured and water efficiency can be reached.

The paper attempted to provide a conceptual approach of how green IWRM can be possible, acknowledging the different shortcomings that exist. Besides this, scholarly literature on this issue is not yet developed, although this issue deserves much more attention than it has at present. However, it is always better to act fast, especially standing on the brink of climate catastrophe, otherwise the whole notion of sustainable development will never be achieved.

References

- Adger W, Huq S, Brown K, Conway D, Hulme M (2003) Adaptation to climate change in the developing world. *Prog Dev Stud* 3:179–195
- Ahmed A (2006) Climate change in Bangladesh—a synthesis, climate change cell, department of environment, Dhaka
- Ahmad IH (2009) Climate policy integration: towards operationalization. United Nations Department of Economic and Social Affairs, New York
- Bates B, Kundzewicz Z, Wu S, Palutikof J (eds) (2008) Climate change and water, IPCC technical paper IV, Intergovernmental Panel on Climate Change, Geneva
- Cap-Net (2005) Integrated water resources management plans—training manual and operational guide, International Network for Capacity Building in Integrated Water Resources Management, Available at http://www.cap-net.org/TMUuploadedFiles/FileFor67/IWRM_Plan.doc
- Cap-Net (2009) IWRM as a tool for adaptation to climate change. International Network for Capacity Building in Integrated Water Resources Management, Available at www.cap-net.org
- David M, Pandya A (2009) Troubled waters—climate change, hydrogeopolitics, and transboundary resources. Henry L Stimson Center, Washington DC
- Eriksen SE, Klein RJ, Ulsrud K, Næss LO, O'Brien K (2007) Climate change adaptation and poverty reduction: key interactions and critical measures. Norwegian Agency for Development Cooperation, Oslo
- GED (2008) Moving ahead—national strategy for accelerated poverty reduction II (FY 2009–11), General Economic Division, Planning Commission, Government of the People's Republic of Bangladesh
- GWP (2005) Climate change adaptation and integrated water resource management—an initial overview, Stockholm
- GWP (2009) Global Water Partnership Strategy, Stockholm, 2009–2013
- Hugé J, Hens L (2007) Sustainability assessment of poverty reduction strategy papers. *Impact Assess Proj Apprais* 25(4):247–258
- Hugé J, Hens L (2009) The greening of poverty reduction strategy papers: a process approach to sustainability assessment. *Impact Assess Proj Apprais* 27(1):7–18
- IFPRI (2009) Climate change—impacts on agriculture and costs of adaptation. International Food Policy Research Institute, Washington DC
- Jonker L (2007) Integrated water resources management: the theory—praxis—nexus, a south african perspective. *Phys Chem Earth* 32(15–18):1257–1263
- Klein R (2008) Mainstreaming climate adaptation into development—briefing note for the European parliament temporary committee on climate change. Stockholm Environment Institute, Stockholm

- Klein RJ, Kartha S, Persson Å, Watkiss P, Ackerman F, Downing TE et al (2008) Adaptation: needs, financing and institutions. Stockholm Environment Institute, Stockholm
- Kramer AM (2007) Adaptation to climate change in poverty reduction strategies. United Nations Development Program, New York
- Mazvimavi D, Hoko Z, Jonker L, Nhapi I, Senzanje A (2008) Integrated Water Resources Management (IWRM)—from concept to practice. *Phys Chem Earth* 33(8–13):609–613
- Merrey D, Drechsel P, Penning de Vries F, Sally H (2005) Integrating ‘livelihoods’ into integrated water resources management: taking the integration paradigm to its logical next step for developing. *Reg Environ Change* 5:197–204
- MoEF (2008) Bangladesh climate change strategy and action plan. Ministry of Environment and Forest, Dhaka
- Pahl-Wostl C (2007) Transitions towards adaptive management of water facing climate and global change. *Water Resour Manage* 21:49–62
- Parry M (2009) Climate change is a development issue, and only sustainable development can confront the challenge. *Clim Dev* 1:5–9
- Slootweg R (2009) Integrated water resources management and strategic environmental assessment—joining forces for climate proofing. Netherlands Commission for Environmental Assessment, Istanbul
- UN (April 2008) United Nations Department of Public Information. Accessed 31 May 2010, available at <http://www.un.org/millemiumgoals/2008highlevel/pdf/newsroom/Goal%207%20FINAL.pdf>
- UN-DESA (2008) The millennium development goals report, New York
- UNDP (2006) Beyond scarcity: power, poverty and the global water crisis. Human development report, United Nations Development Programme, New York
- UNESCO (2009) Climate change and water—an overview from the world water development report 3: water in a changing world, United Nations World Water Assessment Programme, Perugia
- World Bank (2009) Convenient solutions to an inconvenient truth: ecosystem-based approaches to climate change. The World Bank, Washington