CHAPTER 1

INTRODUCTION

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*Adaptive management is learning to manage by managing to learn (*Bormann, Cunningham, Brookes, Manning and Collopy, 1994)

*...fundamentalisms disable. Inability to admit ignorance or error inhibits learning. It is hard for the know-all to know more, or the always right to improve (*Chambers, 1997)

1.1 SETTING THE SCENE

The IWRM approach was adopted by the United Nations in 1992 during the International Conference on Water and the Environment held in Dublin for achieving sustainable development and use of water resources (Global Water Partnership [GWP], 2000a; Biswas, 2004). At the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002, it was agreed that all countries would 'develop IWRM and water efficiency plans by 2005' (GWP, 2000a; Salaman, 2003). The IWRM approach aims at promoting the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems (GWP, 2000a). Since the adoption of IWRM by the United Nations, the Global Water Partnership (GWP) through its IWRM processes has been advocating an integrative perspective for water management that is responsive to economic, environmental and community outcomes.

The term Integrated Water Resources Management (IWRM) is now widely used among water professionals to mean a process to pursue sustainable usage and management of water resources. The most widely used definition has been espoused by the Global Water Partnership, which defined IWRM as (GWP, 2000a):

> …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. (p. 22)

The practical implementation of IWRM as espoused by the GWP and many others (GWP, 2000a; GWP, 2000b; UN-Water, 2008) has encountered difficulty in many countries including Bangladesh, due to the existing structure of the governance of water resources. Mostert (2006) highlights the implementation of IWRM in the Netherlands 'with a long IWRM history' (p.19). He discusses the Dutch Water Management and how IWRM has had a specific impact on that country. He shows that the principles of IWRM are not easy to implement, a changed approach to water resource management is required (Mostert, 2006). Since IWRM concepts encompass social, political, economic, environmental and cultural

aspects of water, land and the community, a 'reflexive governance' structure is required (Gill, 2005).

Rooy and Jong (1995); Ast (1999) and Slobbe (2002) as cited by Mostert (2006) identify that:

> IWRM was eco-centric and technocratic, had a narrow water management focus and paid too little attention to the relation between land and water management, to public participation and to the societal and economic aspects of water management. (p. 23)

It has also been critiqued on the grounds that given various economic, social and environmental objectives, practical implementation of these principles could be problematic as the terminology tasks a 'challenging and unwieldy concept' (Butterworth, Warner, Moriarty, Smits, and Batchelor, 2010). It is also perceived that there is certain 'vagueness' in the IWRM concepts like governance and sustainability (Butterworth et al., 2010). Blomquiest, Haisman, Dinar, and Bhat (2005) argue that 'despite improvements, significant water resource management problems remain in all the cases we studied'. International Water Management Institute [IWMI] and GWP (2008) also concluded that IWRM implementation might be difficult for some countries, given the socio-economic structure as well as existing institutions governing water resources. Despite the criticism, however, there is growing support for IWRM principles. Butterworth et al. (2010) observe that the IWRM concept addresses the problems of water resources with a 'more holistic approach'. They also suggest that without rejecting the usefulness of the IWRM principles altogether, it might be helpful if the target for IWRM outcomes could be set at a practical level, with emphasis on achievable targets.

1.2 THE PROBLEM IN IMPLEMENTATION OF IWRM

Issues related to the efficient use and management of water resources have gained global importance, particularly concerning the implementation of IWRM at local and global levels (UN Water, 2008). In many countries, a low level of understanding of the issues involved and inadequate governance structures have become critical factors hampering the implementation of IWRM (GWP, 2000a; Biswas, 2004a). Many institutions are rooted in a centralised culture with fragmented and supply-driven water management. There are often inadequate economic, social and environmental criteria to support the approval of policies, plans and projects related to water (Jonch-Clausen, 2004).

It is evident from Bangladesh's National Water Policy of 1999 (Government of Bangladesh [GOB], 1999) and the National Water Management Plan (NWMP) (GOB, 2004) that IWRM plans have been incorporated in these policy documents but IWRM principles are yet to be implemented and/or integrated. This thesis seeks to examine whether the desired progress in implementation of IWRM has indeed been achieved. These two policy documents are basic guidelines for ensuring full implementation of IWRM principles in the water sector in Bangladesh. This thesis explores the possibility that reflexive governance could enhance the achievement of the stated aims of IWRM. How this could be done is a research priority that has received little attention in many countries including Bangladesh (Huda Shamsul, 2005). This research examines whether the existing structures of water institutions are capable of delivering IWRM principles or whether further reforms in the water sector are required. The main focus of this research is the governance arrangements of IWRM planning and implementation.

Managing change to achieve IWRM outcomes needs a robust multi-disciplinary approach including 'Adaptive Water Management' (Lenton and Muller, 2009a). In recent times, 'Adaptive Management' (AM) and 'Adaptive Water Management' (AWM) are being used to implement IWRM in some countries, particularly in Europe (Pahl-Wostl, 2007). AWM is a 'means of improving water management via a systematic approach; accommodating change through a learning process, taking into account the outcomes of implemented measures, intended to be an iterative process,' via adaptive management (Sullivan, 2010, p.8). AWM helps in the promulgation, implementation and assessment of IWRM. According to Gunderson, Holling and Light (1995), 'adaptive management embeds uncertainty as fundamental principle in the management approach'. Lee (1999) argues that 'adaptive management is a methodological innovation in resource management. Like any method, the adaptive approach implies revised ends as well as novel means: as its name implies, adaptive management promotes learning to high priority in stewardship'.

The objective of this thesis is to find the attributes of 'reflexive governance' which are required to overcome the obstacles in implementing the Integrated Water Resources Management (IWRM) principles in Bangladesh, using a multi-disciplinary management approach. The findings of the study may be useful for many countries including Bangladesh, for progressive implementation of IWRM principles. It is widely acknowledged that managing water resources is a real challenge for many countries particularly for developing nations (Tortajada, 2010). Since it is perceived that IWRM could deliver a better result in the sustainability of water resources, it is arguably essential to implement the principles of IWRM (Jarraud, 2008).

It is useful to define 'reflexive governance' in the context of IWRM implementation. Reflexive governance is an approach of governance that requires the functioning of institutions and processes which would help the actors and players within a sphere for learning not only about policy options, but also about their own schemes and agenda (Scott, 2007). It is argued that 'reflexive governance then emerges as one possible response to the failures of other governance approaches currently being relied upon by policy makers' (Schutter and Lenoble, 2010: p.1). Lenoble and Maesschalck (2010, p. 9) present four approaches to reflexive governance as:

- Neo-institutionalist economics approach
- Collaborative-relational approach through dialogue
- Pragmatist
- Pragmatic and internalist or 'genetic governance'

Lautze, de Silva, Giordano and Sanford (2011) present an analysis of attributes of effective water governance and approaches to reflexive governance are aligned with those attributes. Lautze et al. (2011) point out that:

> ...given that water governance is essentially the processes and institutions through which decisions are made related to water, it follows that effective water governance is the extent to which qualities that enable effective decision-making are actually present in facilitating decision-making processes. (p. 4)

van der Lee (2002) argues that to attain reflexive governance in river basin management existing institutions would have to modify somewhat in accordance with 'community needs,

broader narratives and concerns' (p. 256). The current study seeks to examine the approach on the basis of the practices of reflexive governance which ensures effective water governance to deliver IWRM principles in Bangladesh. Further description of the aspects of reflexive governance is given in Chapter-2 (section 2.7.1) where analysis of IWRM is presented.

1.3 RESEARCH STATEMENT

The complex issue of balancing the demand and supply of increasingly scarce resources like water at the local and global level needs national as well as international action (Fisher, 2009). More than 2 billion people in 40 countries live in river basins under 'water stress.' This has been caused by decreasing per-capita water availability, as the global population increased by a factor of 3 in the 20th century, while water withdrawals increased by a factor of 7. With the global population estimated to increase from 6 billion to 10 billion in the next 50 years, the pressure on water is going to increase (World Bank, 2006). Observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems (Bates, Kundzewicz, Wu & Palutikof, 2008).

Given this 'gloomy arithmetic of water' as feared by the World Water Commission (2000), it is argued that developing countries require an 'effective governance' through IWRM principles in the water sector to tackle social, economic and environmental challenges (UNDP, 2004).

It is argued that IWRM is a continuous process (GWP, 2000a). Implementation of the principles of IWRM in countries like Bangladesh needs an 'adaptive approach' and would face political and resource constraints challenges (Buterworth et al., 2010). This study proposes a 'reflexive water governance' approach which would be evolved and tested for the case of Bangladesh in the subsequent chapters. It is widely perceived that integration of IWRM principles is possible through reflexive and adaptive water institutions with a multi-disciplinary approach (Mysiak, Henrikson, Sullivan, Bromley, and Pahl-Wostl, 2010).

A criticism is that very little is offered in terms of processes to operationalize the IWRM ideals on the ground (Biswas, 2004a). Water management is a complex process involving many actors, with different knowledge and at different levels (GWP, 2000b). The success of management initiatives in such a context is dependent on the capability of change agents to facilitate the integration between different sources of knowledge at different levels (GWP, 2000a). Participatory approaches to planning have been advanced as being the appropriate framework to engage all who have a stake in the management of water resources (Mikkelsen, 1995; Chambers, 1997). It is argued that in a practical sense, the validity of this claim has not lived up to expectations in its application by change agents (Cooke and Kothari, 2001). Cooke and Kothari (2001) argued that proponents of participatory approaches believe that the acts and processes involved in participatory approaches should (Cooke and Kotahari, 2001, as cited in Essaw, 2008):

- Promote sharing of knowledge and negotiation of power relations—macro/micro; central/local; rich/poor—across all levels of state or other global institutions or at the hands of local elites;
- Reduce dominance and empower the poor and marginalized in society;

- Incorporate local people's knowledge into program planning;
- Improve our understanding of the institutions of participation and the individuals involved, and
- Be effective in producing what is considered as 'truth' or at least closer to 'truth' than other less participative, top-down methods of enquiry and knowledge accumulation. (p.82)

Regardless of competing claims, there is a clear need for methodologies that can catalyze, facilitate and support a systematic stakeholder involvement in the learning processes for proactive management of complex water resource challenges. Innovative adaptive management in this uncertain situation may be instrumental in securing water for the livelihood of the world's increasing population and the protection and conservation of the resource to sustain its functions and characteristics (Pahl Wostl, 2007).

Given that change is a fundamental part of the IWRM planning and implementation approach, the processes should be capable of adapting to new economic, social and environmental conditions and to changing human values. An adaptive management approach needs to be explored, that favours an integrative setting for water resource management, taking into account the connections that water represents between economy, environment and community (Pahl Wostl, 2002; 2007). How those improvements could be achieved and instituted are aspects that need to be carefully considered.

1.4 RESEARCH QUESTIONS

The research will attempt to answer the following question: Can 'reflexive governance' help deliver IWRM outcomes in Bangladesh?

The following hypotheses have been tested:

Hypothesis 1: The principles of IWRM have not been effectively implemented within Bangladesh or integrated in the water sector of Bangladesh;

Hypothesis 2: The current institutional arrangements of the water sector in Bangladesh are a barrier to achieving IWRM outcomes;

Hypothesis 3: A Reflexive Governance framework approach can help deliver IWRM outcomes in the Bangladesh water sector, and

Hypothesis 4: Managing change to achieve IWRM outcomes requires a multi-disciplinary approach.

The research has been undertaken using a mixed method approach, including literature reviews, case study interviews and focus groups to test the hypotheses.

1.5 CONTRIBUTIONS OF THE STUDY

Effective trans-disciplinary interaction among policy professionals and resource managers is also required for implementation of IWRM. It is argued that lack of attention to these

'epistemologically reflexive' settings for IWRM is responsible for slow progress in the IWRM implementation area (Jeffrey and Gearey, 2006).

A water governance approach will be proposed, which integrates all necessary elements that affect IWRM (chapter 2). The study examines whether the planning and managing of water resources addresses the ecological, economic and community ambitions or IWRM principles. The expected outcome of the approach is to derive a multi-disciplinary approach to water management in Bangladesh. IWRM principles have not yet been adopted and/or integrated in the Bangladesh water sector (Butterworth et al., 2010).

The applied contribution of this research is to provide specific advice on the institutional or governance arrangements with the potential to underpin IWRM implementation in countries, such as Bangladesh. The form of the thesis has been in part dictated by the necessity of ensuring that the concepts can be communicated to government and non-government stakeholders, who may lack familiarity with IWRM and other key issues.

It is relevant to mention here that the researcher is a career foreign service officer at the Ministry of Foreign Affairs of Bangladesh which is dealing with different policy issues affecting Bangladesh including water resources policy. It is widely accepted that Bangladesh is a country vulnerable to climate change (Iyer, 2008), with a significant impact on the water resources of the country. The current study on effective water governance to implement IWRM principles in Bangladesh could assist to gain knowledge in this crucial field.

1.6 STRUCTURE OF THE STUDY

The thesis is structured as follows:

Chapter 1 provides an overview of the research topic and introduction to thesis structure.

Chapter 2 is a literature review of the concepts, rhetoric and politics surrounding IWRM. Governance issues related to IWRM will be examined and the aims of IWRM espoused by the Global Water Partnership (GWP) critically explored. Progress towards achieving IWRM internationally will be analysed along with the role of the United Nations, GWP and other international organisations, which are promoting IWRM. This chapter will synthesise learning from theory and practice within the literature and result in the development of a 'Water Governance Approach' for Bangladesh, which will subsequently be tested.

Chapter 3 presents the research methodology. The research methodology includes mixed methods of enquiry including literature reviews, case study in-depth interviews and focus groups.

Chapter 4 presents the international experiences of the implementation of IWRM. Experiences in respect of water policy and governance of Australia as a developed country and India as a developing country are reviewed to determine whether a reflexive governance structure was used to progress IWRM principles in these two countries. The lessons learned in respect of water policy and governance in the context of implementing IWRM in Australia and India are integrated into the evolving water governance approach.

Chapter 5 presents the status and conditions of the institutional and policy arena for implementing IWRM principles in Bangladesh, along with background, aims and approaches, and institutional and governance arrangements. It is examined here whether existing institutions and elements in the water sector of the country are helpful to pursue the proposed 'water governance approach' or whether any adjustment is required in the proposed approach to achieve IWRM principles.

Chapter 6 presents a synthesis of the data collected and feedback received from the case study in-depth interviews and focus groups in Bangladesh.

Chapter 7 presents the conclusions of testing the 'reflexive governance approach' in the planning and implementation of IWRM principles, examining whether water institutions should be reformed with a multi-disciplinary approach to realise IWRM principles. This is followed by a summary of the findings of the thesis, a review of the thesis and implications for theory and practice in terms of conceptual and applied contributions of the study. Conclusions of the research study are drawn here with general advice to implement IWRM in countries such as Bangladesh with recommendations and areas of further study.

The structure of the thesis is presented in Figure 1.

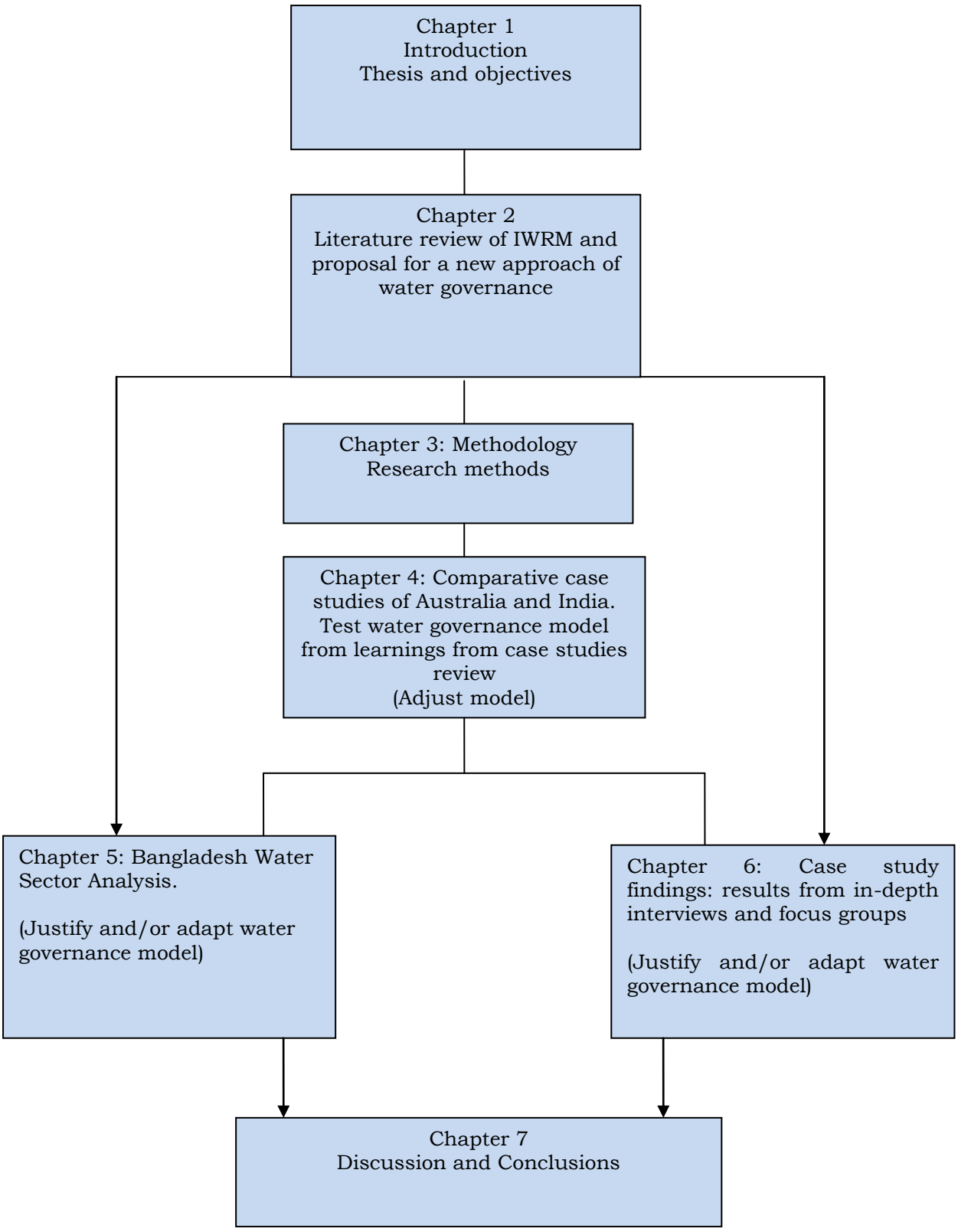

Figure: 1. Overview of the structure of the thesis

CHAPTER 2

CRITICAL REVIEW OF INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

2.1 INTRODUCTION

This chapter provides a critical review of Integrated Water Resources Management (IWRM) as a prelude to appraising the implementation status of IWRM in Bangladesh. It is important to the thesis is in providing an in-depth explanation of key concepts of IWRM, and the variety of critical perspectives that has arisen concerning the theory and the implementation of the concept. This understanding has framed the conceptual design of the research and the questions that were addressed in both the desk and field research.

Sustainable water resources management through IWRM is expected to facilitate developing countries to achieve the Millennium Development Goals (MDGs) (Fisher, 2009). Reduction of poverty, food security, women's empowerment and climate change are linked with sustainable water resources management (Fisher, 2009). Since the central aim of the thesis is to examine whether reflexive governance can deliver IWRM principles in the country, it is essential to have a clear understanding of IWRM principles. This would also facilitate an understanding of the stated policies of the Government of Bangladesh. Here the meaning of IWRM, governance, role of international agencies and associated factors of IWRM will be presented. The synthesis of IWRM leads to the development of an approach of water governance, which is further evolved and finally tested in subsequent chapters.

Good water governance must be supported by the government and by the users (Rogers and Hall, 2003). Individual countries are at different stages of implementing IWRM principles, with most countries taking their first—but most significant—steps to incorporate IWRM principles into their national development agenda (UN Water, 2008). Some countries such as the Netherlands and Israel have progressed further by formulating their own IWRM-based national strategies and plans (UN Water, 2008). A few countries (such as the Netherlands and Australia) have already fully embraced IWRM principles and have begun implementing them in concrete ways (GWP, 2006). Bangladesh is no exception to this trend, as the country has adopted IWRM approaches to manage its water resources (GOB, 2004; GWP, 2004).

2.2 MEANING AND AIMS OF IWRM

The sudden rise in familiarity of integrated management is one of the key issues in the water sector. It is useful to provide a brief review of the articulation of IWRM in the wider context of the thesis. Since the government agencies as well as other water professionals around the world have been using IWRM terminology to achieve water sustainability, it would be useful to have a general understanding of the approach. To support effective participation by the stakeholders of the water sector in the planning and managing the sector, it would be an added advantage if the IWRM terminology were familiar. As Wolff and Gleick (2002, p.1) put it:

> the world is in the midst of a major transition in the way we think about—and manage our vital and limited freshwater resources.

El Ashry (2001) claims there is a linkage between effective water management and environmental degradation (El Ashry, 2001, as cited in Bandyopadhyay , 2006a):

> The water crisis is real, but we cannot underestimate its complexity and linkages to poverty, food and environmental insecurity, and hopelessness. The problem is not just lack of water. It is also the degradation and depletion of water ecosystems—the lakes, rivers and wetlands that are the life support system for citizens and economies of developing countries. (p. 20)

Bandyopadhyay (2006a, p. 20) argues that before consensus as to the meaning of IWRM the terminology had wide publicity. The IWRM terminology needs to be integrated with 'many other aspects of water systems'.

The term IWRM is now widely used among water professionals to connote process to support sustainable usage and management of water resources. The most widely used definition has been espoused by Global Water Partnership (GWP, 2000a).

The key principles of IWRM are (GWP, 2003):

- Water should be treated as an economic, social and environmental good;
- Water policies should focus on both the management of water (demand) and the provision of water (supply);
- Government regulatory frameworks are critical in fostering the sustainable development of water resources;
- Water resources should be managed at the lowest appropriate level (i.e., in communities and villages as opposed to in capitals), and
- Women should be recognized for and supported in the central role they play in the provision, management and safeguarding of water.

IWRM is a process of a political nature, where different and often opposing water related interests are considered, balanced and decided upon. It has been claimed that progress is being made in IWRM in particular river basins or in particular countries (UN Water, 2008). The United Nations and the GWP conducted a survey of the IWRM plan status of 59 countries (Africa-24; Americas-14; Asia-15; Developed countries-6) (UN Water, 2008). Although there is a difference of approach in the GWP Survey and UN Water Survey, and the surveys used different terminology, there are grounds to make a general comparison between them. The UN Survey draws final conclusions about the implementation status of IWRM in those 53 countries where it was observed that there are modest improvements in the summary statistics, as given in Table 2.1.

Table 2.1 Progress of IWRM implementation in different countries

Type of Countries	Status of IWRM
Developed Countries	For the six countries considered in this comparison there are no significant differences between the surveys; As a group the developed countries are well advanced in the process of incorporating IWRM principles into their national plans and most are well on their way to implementing those plans
Developing countries and countries with economies in transition	In 22 countries the UN-Water Survey shows a higher level of progress than the GWP Survey; In 7 countries there seems to have been a lower level of progress (6 of these being in Asia); In 24 countries there has been little measurable change; It is in the Americas that the greatest overall progress has been made.

Source: Adapted from UN Water (2008).

The importance and the difficulty of implementation of decentralisation and stakeholder participation in water management is recognised. Obtaining the consent of all affected stakeholders to be included in the decision-making processes can be difficult and controversial (World Water Council [WWC], 2003). Critics argue that with different objectives, the implementation of IWRM principles could be problematic as the terminology used makes it a 'challenging and unwieldy concept' (Butterworth et al., 2010). It is also criticised that there is 'vagueness' in concepts such as governance and sustainability (Butterworth et al., 2010). Blomquiest et al. (2005) argue that 'despite improvements, significant water resource management problems remain in all the cases we studied'. IWMI and GWP (2008) find that IWRM implementation might be difficult for some countries given socio-economic conditions. Butterworth et al. (2010) observe that the IWRM concept, however, addresses the problems of water resources with a 'more holistic approach'. They also contend that without rejecting the usefulness of the IWRM principles altogether, it would be better if the aspirations of IWRM could be set at a reasonable level, with a focus on the positive aspects. They presented a comparative analysis of the positives and negatives of IWRM recommending strategies to implement IWRM in a practical way (Table 2.2).

Table 2.2: Common criticisms of IWRM

IWRM criticisms/problems	Solutions or ways forward
• Vagueness of IWRM concept. • No agreement on fundamental issues such as aspects to be integrated, how, by whom, or even if such integration in a wider sense is practically possible. • IWRM is not sufficiently people-centred. • IWRM does not adequately incorporate adaptive management principles. • Concept is unwieldy. • Packages of IWRM reforms do not include local IWRM • River Basin Organisations (RBOs), or catchment agencies may struggle to establish legitimacy. • RBOs or catchment agencies often lack the capacity to fulfil even basic functions. • IWRM activities ignore politics. • Levels of participation in IWRM are low.	• IWRM should be considered more as a philosophy than as a 'package of reforms'. • IWRM principles should be built into projects and programmes. • Local laws and customary institutions should be an entry point for IWRM. • Better linkages should be built with local government and its planning processes. • IWRM should be built from bottom up. • IWRM reforms need to build upon existing mechanisms for participation and organisation of stakeholders around water management, even if this means building 'sectorality', rather than a complete overhaul. • 'Light' approaches that aim to apply IWRM principles at all stages of the project cycle (e.g. visioning, assessment, planning, implementation, monitoring and evaluating, etc) are more likely to be good entry points. • Supporting existing local arrangements should be encouraged as a form of local IWRM. This is more likely to succeed than starting from scratch at the catchment level. • Although local IWRM initiatives often have limited scope, they can still contribute to the development of IWRM at basin scale and, as such, serve as important entry points for applying the IWRM framework. • Forging better links between water, sanitation and hygiene (WASH) sub-sector and IWRM is another way to strengthen grassroots participation in IWRM. • Responding to wider 'domestic' needs of many consumers, such as for small-scale productive uses of water, is another way to implement IWRM

Source: Adapted from Butterworth et al. (2010, p.75).

The Inter-American Development Bank (IDB) conducted a study in 1999 on implementation and capacity development for IWRM for borrowing countries in Latin America (Hofwegen and Jaspers, 1999). A draft set of guidelines was tested to examine the attainability of IWRM at three levels—constitutional, organisational and functional—through technical, financial

and political aspects. Three pilot projects were undertaken in Guatemala, Jamaica and Colombia for this purpose. Hofwegen and Jaspers (1999) argue that IWRM is 'a process of assignment of functions to water systems, the setting of norms, enforcement (policing) and management' (p. xi). This process incorporates collecting data, analysis of physical conditions and social elements, judging the interests and dynamics of the decision-making process concerning development and management of water resources (Hofwegen and Jaspers, 1999). They suggested the following major steps to implement IWRM in those countries (Hofwegen and Jaspers, 1999):

- Assessment of present situation and trends;
- Formulation of a desired IWRM situation based on an ideal or eventual IWRM situation;
- Formulation of interventions to arrive at the desired IWRM situation, and
- Establishment of a monitoring system to see whether the interventions are being carried out properly and whether these really contribute to the achievements of the IWRM goals.

IWRM is essentially about the practical integration within human socio-economic systems, natural resource systems, and physical processes (such as the naturally occurring interplay between the hydrological cycle, land, flora and fauna). Practicing IWRM means seeing watersheds, rivers, lakes, wetlands, coastal zones and oceans as part of an interdependent system; recognising the ways in which the hydrological cycle affects and is affected by land use; and aiming to create governance systems, policies, institutions and instruments that take these physical processes into account in planning, decision-making and implementation. IWRM provides a framework for balancing natural processes with social, economic and environmental needs and objectives. Some examples of practical water management elements are water resources assessments and information dissemination; awareness raising; allocation and conflict resolution; regulatory instruments, technology and financing (UNDP, 2004).

IWRM is a challenge. It depends upon effective, transparent governing institutions with the capacity to bring about significant changes in the way in which politics, laws, regulations, institutions, civil society, consumers, and voters interact. The rigid functional divisions within governments as well as international development agencies work against the cross-cutting, holistic approaches to development planning and resource management that IWRM requires. Building national capacity has emerged as a particularly elusive goal in development cooperation, and initiatives in all sectors have constantly faced both a lack of necessary skill and weak institutions. Building capacity for integrated programming continues to be difficult, when ministries are organised along sectoral lines and poverty reduction and environmental protection/management plans are drawn up separately. Nonetheless, IWRM offers a way to approach these issues in a new and potentially more effective way (UNDP, 2004).

The IWRM approach recognises that complementary elements of an effective water resources management system must be developed and strengthened concurrently. These complementary elements include the enabling environment, the institutional roles and the management instruments (Jonch-Clausen, 2004).

IWRM involves the coordinated planning and management of land, water and other environmental resources for their equitable, efficient and sustainable use (Calder, 1999). IWRM expresses the idea that water resources should be managed in a holistic way,

coordinating and integrating all aspects and functions of water extraction, water control and water related service delivery so as to bring sustainable and equitable benefit to those entirely dependent on the resource (EC, 1998).

Biswas, Varis, and Tortajada (2005) argue that the definition of IWRM has little practical essence.. They argue that this definition is 'an amorphous definition' which could not help water managers to solve real life problems. It was concluded that 'even though on a first reading the definition formulated by the GWP appears impressive; it really is unusable, or un–implementable, in operational forum' (Biswas et. al. 2005). Biswas et. al. (2005) point out that the 37 sets of issues, which different authors consider should be integrated while considering the IWRM concept, is almost impossible to achieve. It was suggested that:

> …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, nor are there any indications that they are likely to do so in the foreseeable future (Biswas et. al. 2005).

Biswas et. al. (2005) contended that after almost half a century of existence of terminology of IWRM it was not possible to find a 'practical framework' to implement the IWRM and finally concluded that IWRM may not be possible to implement. Biswas (2004a) earlier commented critically that:

> …a comprehensive and objective assessment of the recent writings of the individuals and institutions that are vigorously promoting integrated water resource 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. (p. 249)

In response to these comments, Mitchell (2004) points out that there is a need for a gradual development of IWRM. Disagreeing with Biswas (2004a) on his evaluation of IWRM only in terms of operational considerations, he stresses that 'the value of IWRM may be greater at the normative and strategic levels, to provide context or a framework for different types of approaches at an operational level.'

Responding to the criticism of Biswas (2004a) on the definition of IWRM presented by the GWP, Lamoree (2004) argues that the IWRM concept has led to developments that were desirable. It created a wave of awareness at the political and the grassroots level about the importance of water to life; a move away from single-sector institutional responsibilities and decision making towards more integrated and multi-sector decision making processes at the government level. He argues that the concept of IWRM generated a renewed focus on stakeholder participation, widened the role of the water profession which led to increasingly include non-technical disciplines and multidisciplinary research in the water sector (Lamoree, 2004).

Biswas (2008) argues that the rhetoric of IWRM may wane with a focus on the management of the water resources:

> ...the most likely scenario of the future will be that its past and present promoters will gradually and progressively start downplaying the strong rhetoric of IWRM, and start focusing on the "ends" of water management rather than focusing with the recent exclusive emphasis on only one of its many "means". (p. 6)

Among the emerging topics of integrated water systems studies and the economics of water, the valuation of its ecosystem services need special mention. A more detailed analysis of the diverse challenges in integrated water systems management of South Asia was undertaken by Mollinga, Dixit, and Athukorala (2006). In developing a framework for water systems research, the physiographic diversity of the region requires serious consideration, since mountainous and upland watersheds, foothills and floodplains and delta areas differ widely in terms of the natural environment and the social relations with water systems.

Falkenmark and Rockstrom (2005) suggest that a 'redefinition of integrated water resource management (IWRM) is required, both in terms of focus (generally perceived in terms of allocation of blue water resources) and scale (generally perceived in terms of water resources management at basin scale).' They point out that the focus should be redirected, from a blue water perspective, towards considering the full water balance as 'manageable', including vapour flow, or green water flow. They also argue that a necessary conceptual advancement of IWRM is to incorporate land use, that is, put emphasis on integrated land and water resources management (ILWRM). It is desirable to incorporate the strategic planning of water for livelihoods and sustainability, as shown by evidence from water use in different countries where legacies proved inadequate due to exclusion of land in the strategy (Falkenmark and Rockstrom, 2005).

The IWRM concept is still vague and connotes different meanings to different users (Cardwell, Cole, Cartwright, and Martin 2006). This has created problems in the implementation of IWRM principles.

Cardwell et al. (2006, p. 9) define IWRM as 'a coordinated, goal-directed process for controlling the development and use of river, lake, ocean, wetland, and other water assets'. They find in the context of the US that integration is needed among the water management institutions for effective coordination among different agencies. They explain the necessity of the integration of water resources management along the four axes of space, objectives, institutions and time as (Cardwell et al., 2006):

- *Spatial Integration*: coordination of management for unified achievement of common objectives and goals within a geographic area and among vertical strata from lithosphere to atmosphere;
- *Objective Integration*: coordination of management for some optimum achievement of multiple objectives, such as for agricultural, forest, soil, flood control, navigation, recreation, hydro power, water supply, and environmental resource improvements;
- *Institutional Integration*: coordination across mandates, missions, policies, programmes, projects, and management measures of governmental and non governmental institutions into unified achievement of common objectives and goals, and
- *Temporal Integration*: coordination of activities on different time scales—from daily operations to considerations decades away—into unified achievement of common objectives and goals. (p. 12)

McDonnell (2008) discusses challenges of 'real integration' of IWRM in many countries. He argues:

> At present the possibilities for truly integrated water resources management are limited, not by a conceptual framework, but by the ability to really represent the full dimensions of variables, interactions and complexity that come into play in any water management project or policy. (p. 142)

Another definition of IWRM has been given by United States Agency for International Development [USAID] (2003):

> IWRM brings together governments, communities, and other stakeholders to choose among alternative uses of freshwater and coastal resources. Using a participatory planning and implementation process, these stakeholders identify ways to meet their diverse water needs without depleting or damaging water resources and their underlying ecosystems. (p. 1)

The World Bank (2004) articulates IWRM with its integration of issues in water management as:

> The main management challenge is not a vision of integrated water resources management but a "pragmatic but principled" approach that respects principles of efficiency, equity and sustainability while recognizing that water resources management is intensely political and that reform requires the articulation of prioritized, sequenced, practical and patient interventions. (p. 3)

The World Bank assumes the definition of IWRM is implicit and puts its emphasis on improvement of water management by the governments.

The meaning of implementation of IWRM depends on the community or the country concerned. Integration at different levels is the key for progressing IWRM principles in a country (Cardwell et al., 2006; World Bank, 2004). Lenton and Muller (2009a) present a critical analysis of definitions of IWRM and provide the following five aspects of IWRM approach:

- There is no 'magic bullet' for all situations. IWRM is an approach rather than a method or a prescription.
- Although it usually involves tradeoffs, integrated water resources management need not be a zero sum game, and 'win-win' outcomes can often be found.
- Successful IWRM efforts adopt an integrated approach in order to address specific development problems; they never have an integrated approach as their principal objective.
- The IWRM concept reflects good practice rather than radical new directions; in fact, there are many excellent examples of IWRM in practice that pre-date the formal adoption of the concept in 1992.
- The process of water management does not have an end point and will continually have to respond to new challenges and opportunities. (p. 208)

It transpires that there is no common definition of IWRM. IWRM is a political process, which has social, economic and environmental implications. Basically IWRM is a continuous process and has been evolving over time. IWRM can facilitate better water governance to tackle the sustainable management of water resources (Lenton and Muller, 2009a).

2.3 GOVERNANCE OF IWRM

Governance is the central issue of IWRM (Rogers and Hall, 2003). The definition of water governance given by the Global Water Partnership (GWP) is "the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society" (Rogers and Hall 2003, p.18). An improved legal and institutional context/framework with more transparency and accountability is required for effective governance to implement IWRM (World Resources Institute, 2004). The water sector is very responsive to the quality and effectiveness of public governance (Rogers and Hall, 2003).

Governance involves relationships that can be manifested in various types of partnerships and networks (Rogers and Hall, 2003). A number of different actors with different objectives are involved, such as government, civil society institutions; trans-national and national private sector interests (UN-Water, 2006a).

The governance issue is one of the fundamental issues of the global and national debates which do not reflect a consensus as to what governance comprises (European Commission, 2001). A review of the literature reveals that the term governance has been used to describe a wide range of conditions that include the duties and obligations of the government; civil society and the business houses; decision-making processes; management actions at all levels; the behaviour of individuals and communities; institutional structures and settings; legal and statutory instruments, and idealised processes of participation or collaboration (Turton, Hattingh, Claassen, Roux, and Ashton, 2007). In some cases, the word governance simply appears to have been appended to a particular descriptor of a system or situation as if it's presence in the now expanded term could provide greater 'legitimacy' or 'public acceptability'(Turton et al., 2007). This unfortunate feature is one that is also shared by the inappropriate use of the word 'sustainable'—again appended as if it could confer some form of authenticity or validity to a particular situation or activity (Turton et al., 2007). Many descriptions of governance have also been linked to specific considerations, where governance is considered to be a process, a structure, a system of values or a specific outcome. While each of these applications are no doubt appropriate within their specific contexts, the sheer variety of these uses has created considerable confusion about the underlying concept and meaning of governance and, in particular, the concept of 'good governance'(Turton et al., 2007). In the context of IWRM, it is therefore important to understand and properly contextualise the term so that it helps to clarify decisions and actions, rather than adding to confusion. The emphasis on broadening the participation of stakeholders in IWRM seeks to ensure that prudent water resource management can enhance the quality of life of all citizens while simultaneously ensuring the long-term viability of the water resources upon which all development depends (Turton et al., 2007). This approach mirrors the concept of sustainable development and reflects the fundamental inter-

dependence between economic development, the natural environment and people (World Commission on Environment and Development [WCED], 1987). This approach requires all segments of society to co-operate within a governance system that reflects their values, principles, aspirations, imperatives and objectives (Folke et al., 2002). This recognition also means that government, civil society – or the lay public –and scientists or technology providers must co-operate closely and share a common vision of the future. This view provides strong support for the 'Trialogue' model of governance that links government, civil society and science in a set of partnerships, and that promotes close collaboration and interactions between each of these sectors (Figure 2.1). In this view, particular emphasis is placed on the interfaces between the three sectors and their contribution to good governance.

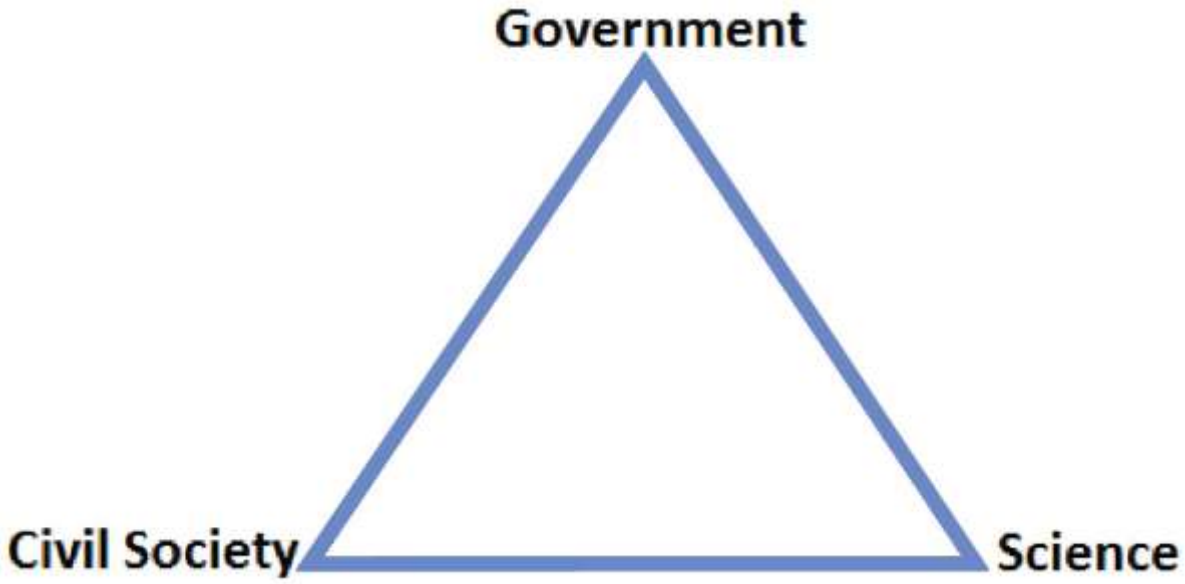

Figure 2.1: Trialogue of IWRM-Government, Civil Society and Science. Source: Adapted from Turton et al. (2007)

The European Commission (2001) has presented a useful set of five principles of good governance. These principles are:

- Openness: where governance institutions are transparent and inclusive, communicating freely about what they do and the decisions that are taken, using language that is accessible and understandable to all stakeholders;
- Participation: where the quality, relevance, and effectiveness of policies, legislation, regulation, and practice depend on public participation from conception to implementation, to create greater confidence in the institutions of governance and the outcomes of policy;
- Accountability: where every role in the legislative, administrative, and executive processes is made clear, and where there is appropriate clarity and responsibility from everyone who is involved in developing and implementing policy at every level;
- Effectiveness: where policies are timely and appropriate, delivering what is needed, based on decisions made during participative decision-making processes, and
- Coherence: where policies and implementation actions are consistent with other initiatives, and are clearly aligned and well understood by all participants. Those societies that are

> characterized by effective and harmonious interactions between the science, society, and government clusters appear to be more likely to achieve the ideals of IWRM in socially acceptable ways that promote political stability. (p. 10)

Allan and Rieu-Clarke (2010, p. 6) also argue that 'key principles' of good water governance are 'accountability, participation and transparency' which would ensure achieving principles of IWRM, particularly equity and sustainability. It is understandable that the success of meaningful cooperation could be achieved among different stakeholders within each sub-group if a common learning framework is maintained (Roux, Rogers, Biggs, Ashton, and Sergeant, 2006). This should result a win-win situation for all participants (Roux et al., 2006).

The idea of governance in the water sector is slowly gaining momentum even if an acceptable definition is elusive. The meaning of governance could be different to different people in different cultural and country contexts. Its social, political, economic and cultural elements are being discussed and evolving (USAID, 2009).

Huda Shamsul (2005) highlighted that governance has been an issue even in flood management. Sometimes, the issue of flood management has been dealt with as an independent issue and not as an integral part of the water resources management framework of the country. In Bangladesh, in order to bring the various water agencies together, for instance, it is necessary to reform the water agencies, which by the legacy of past practices are fragmented. Issues related to water are being dealt with in a fragmented manner by different agencies (Huda Shamsul, 2005). This would not be helpful in pursuing the IWRM principles as the key element required is integration and coordination among agencies responsible for water resources.

Fisher (2009) argues that governance is essentially 'a multi-dimensional concept and a multi-level activity' involving all in a country and community as well as at the international level. Cordonier-Segger and Khaflan present the definition of governance (Cordonier-Segger and Khaflan, 2006 as cited in Fisher, 2009):

> The exercise of economic, political and administrative authority to manage a country's affairs at all levels and on all issues. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences. (p. 45)

Grover also presents a definition (Grover, 2006 as cited in Fisher, 2009) of water governance in the context of sustainable development of water resources as:

> The range of political, organizational and administrative processes through which communities articulate their interests, their input is absorbed, decisions are made and implemented, and decision makers are held accountable in the development and management of water resources and delivery of water services. (p. 46)

Fisher (2009) presents a number of issues to be considered in order to manage water resources in a sustainable manner through an effective water resources governance arrangement, which he identified as a 'challenge for the legal system'. These are:

- To recognize sustainable development of water resources for what it is—the outcome of a process;
- To recognize and respond to the particular characteristics of water as a resource;
- To recognize that sustainable development of water resources is achieved through an integrated matrix of norms;
- To recognize that some of these norms relate to substance and some to process;
- To recognize that norms of substance and norms of process perform different functions;
- To recognize that norms of substance and of process are essential elements of the overall system;
- To create a set of structurally integrated norms that are part of a system of governance for the sustainable use and development of water resources, and
- To ensure that these norms are structured so as to be enforceable through the judicial system. (p. 52-53)

A Report entitled 'IWRM Implementation in Basins, Sub-basins and Aquifers: State of the Art Review' carried out by the UNESCO under the United Nations World Water Assessment Proramme present the following recommendations (UNESCO, 2009a):

- Case histories should be adequately documented, collected and disseminated.
- Knowledge of IWRM actions that are taking place should be better coordinated.
- Tools for IWRM should be documented with respect to the existing and emerging capacity for BSAs [Basin, Sub-Basin and Aquifer], in particular for carrying out multi-disciplinary processes in IWRM.
- Institutional arrangements to facilitate an IWRM approach at BSA [Basin, Sub-Basin and Aquifer] level should be suggested, with clear distinction between institutions and organization.
- Efforts should be made to achieve a broader recognition that the 'integrated' approach is feasible and beneficial. (p. 15)

In essence, water governance means a combination of political, social, economic and administrative systems established to develop, manage and distribute water resources effectively and efficiently to the community in question with an accountable and transparent way (UNDP, 2004; Tortajada, 2010). Improving water governance does not necessarily mean building new institutions or making drastic changes. Rather, it means working towards building institutional linkages, improving policy coherence, and increasing transparency in decision making (Rogers and Hall, 2003). Lautze, de Silva, Giordano, and Sanford (2011, p. 8) attribute 'Good Water Governance Qualities' with the characteristics of 'openness and transparency; broad participation; rule of law (predictability); and ethics, including integrity (control of corruption)'.

Finally, it transpires that to achieve IWRM principles in the water sector, good water governance is required. Principles of good water governance are as reflected in the earlier discussion are: openness, participation, accountability, & transparency, effectiveness, coherence and a learning oriented framework. Key components of good water governance are government and its institutions, civil society, and policy & science which are interlinked to deliver an effective water management to ensure IWRM. Elements such as political, economic, social and administrative processes are quite important to achieve people's

aspirations and articulation. Effective and good water governance may bring tangible outcomes in the water sector such as, equity, sustainability, legal rights, and institutional linkages, improvement of policy coherence, and transparency in decision making process which ultimately ensure learning.

2.4 AN INTERNATIONAL PERSPECTIVE ON IWRM

The previous discussion identified that the meaning, heritage and aims of IWRM are diverse. The above analysis provides an overview of IWRM implementation, focusing in particular on the coherence of conventional IWRM approaches and the viability of alternative conceptions at the international plane. In this sub-section, the importance of two key international issues – social and environmental aspects – in pursuing IWRM is discussed. This provides clarity as to why IWRM principles are crucial to progress in countries like Bangladesh.

2.4.1 Recognition of social and environmental impacts of IWRM at International Policy level.

In the international arena there is a growing recognition of the relevance of IWRM concepts to tackle social and environmental issues such as poverty, gender imbalance, MDGs, food security, climate change and disaster management (UN Water, 2008). In this section social and environmental implications of IWRM are discussed.

Millennium Development Goals (MDGs) and Water

It is widely believed that the Millennium Development Goals are a priority in the water sector. Efficient and effective water management helps in the fulfilment of various targets of the MDGs (GWP, 2009; Lenton and Muller, 2009a). There are eight MDGs, as outlined below:

- Goal 1: eradicate extreme poverty and hunger;
- Goal 2: achieve universal primary education;
- Goal 3: promote gender equality and empower women;
- Goal 4: reduce child mortality;
- Goal 5: improve maternal health;
- Goal 6: combat HIV/AIDS, malaria and other diseases;
- Goal 7: ensure environmental sustainability (including the target of halving the number of people without access to water and sanitation), and
- Goal 8: develop a global partnership for development.

The MDGs have achieved some successes in water and sanitation services around the world (Goal 7) (GWP, 2009). Essaw (2008, p.18) argued that ‘the articulation of the vision of 192 countries that signed the Millennium Declaration in 2000 on the Millennium Development Goals (MDGs) is, in many ways, a landmark in the history of global development partnership’. The MDGs highlighteda strategic partnership based on responsibility, accountability and mutuality. It is argued that improving water management can make a

significant contribution in achieving the MDGs. IWRM implementation within the MDGs context involves key considerations (GWP, 2009):

- there needs to be a recognition by government policy makers and development planners that better water management, in many different dimensions, is crucial to MDG achievement.
- policy makers and managers in the water sector must understand that their work will be most effective if it is managed in a broader context and if they ensure that they are part of broader development planning processes.
- The adoption of an IWRM approach, deliberately linked to the appropriate national development planning processes will enable the full potential of water management to contribute to the achievement of the MDGs.
- For IWRM to be effective, it must have a clearly identified champion within government to give strategic direction to the process.
- An important requirement for the governmental champion will be to ensure that the institutional framework for IWRM is established and capacitated, and includes provisions for the arbitration of the disputes, which will inevitably arise.
- since a key element of the IWRM approach is to ensure that all who are concerned in water's use play a part in its management, these approaches must involve them in a structured way. (p. 7)

Achieving MDGs requires robust water management which could be facilitated through implementation of IWRM. The links between MDGs and an effective water management are suggested in Table 2.3.

Table 2.3: The UN Water, Poverty (livelihood) and the Millennium Development Goals.

Millennium Goals		How water management contributes to achieving goals	
Issue	Goal	Directly contributes	Indirectly contributes
Poverty	To halve by 2015 the proportion of the world's people whose income is less than $1/day	Water as a factor of production in agriculture industry and other types of economic activity Investments in water infrastructure and services act as a catalyst for local and regional development	Reduced vulnerability to water-related hazards reduces risks to investments and production Reduced ecosystems degradation boosts local level sustainable development. Improved health from better quality water increases productive capacities.
Hunger	To halve by 2015 the proportion of the	Water as a direct input into irrigation, including	Ensure ecosystems integrity to maintain water flows to food

	world's people who suffer from hunger	supplementary irrigation, for expanded grain production. Reliable water for subsistence agriculture, home gardens, livestock, tree crops Sustainable production of fish, tree crops and other foods gathered in common property resources.	production. Reduced urban hunger by cheaper food grains from more reliable water supplies.
Universal Primary Education	To ensure that, by 2015, children everywhere will be able to complete a full course of primary schooling.		Improved school attendance from improved health and reduced water-carrying burdens, especially for girls.
Gender Equality	Progress towards gender equality and the empowerment of women should be demonstrated by ensuring that girls and boys have equal access to primary and secondary education.		Community-based organisations for water management can improve social capital of women Reduced time and health burdens from improved water services lead to more balanced gender roles.
Child Mortality	To reduce by two thirds, between 1990 and 2015, the death rate for children under the age of five years.	Improved quantities and quality of domestic water and sanitation reduce main morbidity and mortality factor for young children.	Improved nutrition and food security reduces susceptibility to diseases.

Source: Adapted from Essaw (2008).

Poverty and Water

Water is an essential resource for maintaining life and livelihood. Ahmad (2003) argues that water plays a critical role in elements of well–being of life such as life expectancy, nutrition, poverty rates, flood displacement, urbanisation rates, and employment migration. Gonzalez (2005) argues that potential strategies and approaches to improve livelihood of the common mass must address water for the following reasons (Gonzales, 2005 as cited in Essaw, 2008):

- We cannot reduce the number of children under age 5 who die without providing water and sanitation;
- We cannot increase the number of children attending schools without providing safe water;
- We cannot talk about feeding more people without water, and
- We cannot talk about reducing poverty by economic development without water infrastructure. (p. 11)

Within this context, the concept of water poverty is relevant. The 'Water Poor' are defined by the GWP (2003) as:

- Those whose natural livelihood base is persistently threatened by severe drought or flood;
- Those whose livelihood depends on cultivation of food or gathering of natural products, and whose water source is not dependable or sufficient;
- Those whose natural livelihood base is subject to erosion, degradation or state confiscation (e.g. for construction of major infrastructure) without due compensation;
- Those living at a long (defined) distance from a year-round supply of drinking water;
- Those obliged to expend a high (i.e., >5 per cent) percentage of household income on water; slum dwellers obliged to pay for water at well above markets rates;
- Those whose water supply is contaminated bacteriologically or chemically, and who cannot afford to use, or have no access to, an alternative source;
- Women and girls who spend hours a day collecting water, and whose security, education, productivity, and nutritional status is thereby put at risk, and
- Those living in areas with high levels of water-associated disease (bilharzia, guinea-worm, malaria, trachoma, cholera, typhoid, etc.) without means of protection. (p. 9)

Biswas (2004) argues that a water development project should incorporate equity and poverty issues. Ahmad (2003) also argues that instruments to tackle different 'water dimensions of poverty' are 'policies, legislative frameworks, regulatory arrangements and instruments, and financial arrangements' (p.271) which can pave the way to contribute poverty reduction. He emphasizes the need for special attention to be given to women, the poor and the disadvantaged. Ahmad (2003) points out that:

> The concept of integrated water resource management (IWRM) provides a holistic approach-based framework for water management that places due emphasis on equitable social welfare, which obviously focuses on, among other aspects, poverty reduction and sustainability of ecosystems. (p. 269)

It is thus important to incorporate poverty issues and equity in the 'water governance approach' to implement IWRM principles.. Better access to clean and safe water increases the standard of living (Fisher and Cook, 2010).

Gender and Water

According to UNDP (2003) gender is not merely the relationship between male and female; rather gender is a wider issue encompassing all social, economic, political and cultural aspects of men and women in a society. With this view in mind, the UNDP (2003) has defined its gender approach as:

> Taking account of gender concerns in all policy, programme, administrative and financial activities, and in organizational procedures, thereby contributing to a profound organizational transformation. Specifically…bringing the outcome of socio-economic and policy analysis into all decision-making processes of the organization, and tracking the outcome. This includes both the core policy decisions of the organization, and the small, everyday decisions of implementation. (p. 8)

A gender perspective in IWRM is necessary for a variety of reasons as presented by UNDP (2003):

- Concern for project effectiveness and meeting project results;
- Concern for environmental sustainability;
- Need for accurate analysis of natural resources use;
- Concern for equality and the interconnectedness of gender equality within UNDP's mandate to support sustainable human development;
- Support for the commitments of partner countries, and
- Participatory processes in IWRM initiatives do not automatically recognise inequalities and differences between women and men. (p. 8)

UNDP highlights that attention to gender is essential in the context of sustainable human development (UNDP, 2003 as cited in UNDP, 1999):

> All governments made commitments to the women and gender equality goals in the Beijing Platform for Action (1995), and recognized gender mainstreaming—"the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels" (ECOSOC 1997) – as the principal means to achieve these objectives. UNDP endorses this approach, and includes the advancement of women as a core thematic area within its Sustainable Human Development (SHD) framework. (p. 16)

According to UNDP (2003) gender mainstreaming implies that:

- Attitudes, roles and responsibilities of men and women are taken into account, recognizing that both sexes and different social classes do not have the same access to and control over resources, and that work, benefits and impacts may be different for the different socio-gender groups, and
- Considering the needs, roles, capacities, benefits and burdens of men and women, rich and poor, young and old becomes the norm rather than the exception. (p. 16)

There are three elements in an approach to gender and IWRM. Each of these elements supports both project efficiency and a concern for gender equality (UNDP, 2003):

- In every initiative, programmers and analysts should take steps to understand the differences and relations among and between women and men in each specific context under consideration (in other words, carry out a gender analysis). Ideally this should be done in a participatory fashion and both women and men should be involved;
- Based on this analysis, all initiatives should incorporate women's and men's perspectives, needs and interests and, where possible, promote the advancement of women (in other words, reduce gender inequalities), and
- Participatory approaches that facilitate the equitable participation of women and men (especially at decision-making levels) should be used.

Different forums such as the International Drinking Water Supplies and Sanitation Decade Review (1990), the Dublin Conference (1992), the World Summit on Sustainable Development (1992, 2002), the 2nd World Water Forum, The Hague (2000), the 3rd World Water Forum, Kyoto, Japan (2003), the 4th World Water Forum held in Mexico (2006) and the 5th World Water Forum in Istanbul have endorsed the concept of mainstreaming gender in the IWRM.

The GWP is helping different countries around the world to implement IWRM plans with its underlying philosophy as mentioned earlier. One of the key principles of IWRM is that 'in developing the full and effective participation of women at all levels of decision-making, consideration has to be given to the way different societies assign particular social, economic and cultural roles to men and women. There is a need to ensure that the water sector as a whole is gender aware, a process, which should begin by the implementation of training programmes for water professionals and community or grass root mobilizers (GWP, 2000a, p.18). One focus of this study is on the issue of how gender could be fit into IWRM in the context of Bangladesh. Ahmed (2008) has analysed the challenge of mainstreaming gender into IWRM as being not only a social and economic issue but also a political issue, particularly in the context of socio-economic conditions prevailing in South Asia. Ahmed (2008) shows how gender could be part of IWRM through different aspects of water management in society such as agriculture, irrigation, domestic water supply and sanitation. Fostering appropriate governance mechanisms is the key to incorporating gender into IWRM, as Ahmed (2008) points out:

> Integral to gender mainstreaming, as the case studies highlight, is the need to strengthen the enabling environment, not only through policies and laws that institutionalize the equitable participation of men and women in water management, but equally to foster the development of gender–sensitive organizations and individuals, women and men, than can lead the process at different governance levels. (p. 202)

Gender mainstreaming is expected to bring the following benefits (Hamdy, Quagliariello, and Liuzzi, 2004):

- Effectiveness: the infrastructure, as well as valuable water resources, will be more widely and optimally used and sustained by all user groups;
- Efficiency: the presence of limited water resources means the sector agency can reach more individuals;
- Development: the service and its social process will not only bring water; it will increase production, income environmental security, health and overall family welfare;
- Sustainable use in freshwater ecosystem: women's and men's direct and fair participation in research and project implementation can increase the potential flexibility and creativity in responding to environmental insecurity and changes in resource system, and
- Equity: burdens and benefits will be shared more equitably between women and men in the community at large as well as in the household. (p. 35)

In achieving IWRM, gender mainstreaming should also be considered as a priority action through the establishment of a network including the existing experiences with a broad collection of dispersed information as a resource guide for mainstreaming gender within the context of integrated water resources management having the following goals in mind, as argued by Hamdy et al. (2004):

- To improve the sustainability and effectiveness of water related activities through incorporation of gender equality perspectives throughout project cycles;
- To improve approaches to the planning, implementation management and monitoring of IWRM, and
- To improve understanding and awareness of gender concepts through an easy reference to existing materials, tools and information. (p.39)

The discussion here identifies that gender mainstreaming is a critical issue in achieving IWRM principles in the water sector. This is more important in developing countries where the gender issue is sometimes neglected.

Sustainability and Water

The sustainability issue has been at the forefront of IWRM implementation (Jonch-Clausen, 2004). Sustainable development has generated a significant debate in policy making circles since its inception in 1987, particularly in the resource management domain. A number of interpretations and definitions have been presented during the last decade, resulting in difficulty in finding a definition that is widely accepted. The World Commission on Environment and Development in 1987 articulated the concept of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987). This widely used definition has proved to be largely unattainable (Marshall and Toffel, 2005) and has been criticised by many researchers as un-operational (Parris and Kates, 2003; Marshall and Toffel, 2005).

Pigram and Wahab (1997) consider that sustainability is an integrative concept in respect of environmental and socio-economic issues. They argue that if humans and nature are put together in the same framework, a holistic view for sustainability could be achieved.

In the GWP technical papers (Jonch-Clausen, 2004), the measuring of the sustainability concept is implicit as shown in the 'three tier pillars' in Figure 2.2.

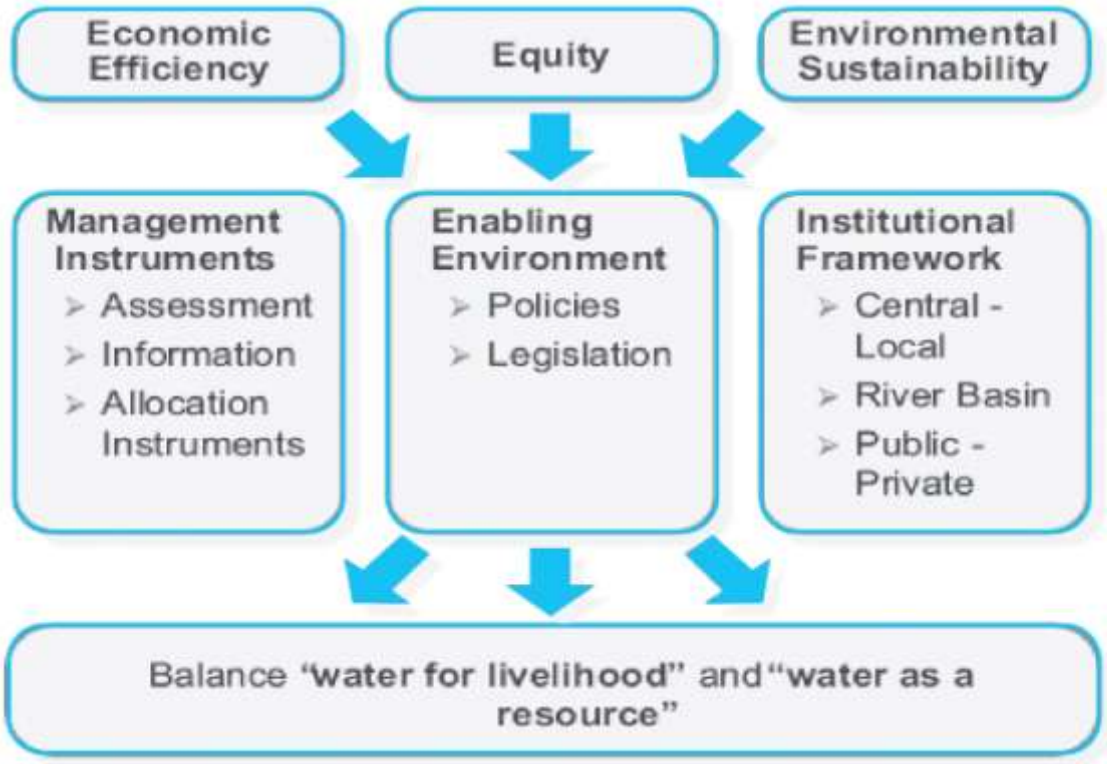

Figure 2.2: Three Pillars of IWRM, Source: Adapted from Jonch-Clausen (2004).

Meppem and Gill (1998) interpret sustainability as a 'learning concept' and suggest it is a state that is in transition continually, the objective is not to win or lose, explicit accounting for perspectives is required and it must involve representative stakeholder participation through dialogue. Water issues are multi-dimensional that need to be looked at with an integrative manner with a holistic perspective (Essaw, 2008).

The foregoing analysis suggests that to attain environmental, social and economic sustainability of water resources it is important to pursue Millennium Development Goals (MDGs), including alleviating poverty and mainstreaming gender in the water sector. Food security and environmental sustainability are crucial factors in implementing IWRM. UN-Water (2006a) argues that 'water is central to alleviating poverty' (p.43) as more than 800 million people in the world do not have enough food and water to live a decent life. Achieving MDGs would be easier with 'a holistic, ecosystem-based approach known as Integrated Water Resources Management (IWRM)' (UN-Water, 2006a, p.44). Effective water governance can deliver IWRM principles, which ultimately help countries to tackle those critical development challenges (USAID, 2009).

2.5 ROLE OF THE UNITED NATIONS (UN) IN PROMOTING IWRM PRINCIPLES

As a component of the environmental movement, water related issues were also brought to the attention of the international community by the United Nations. In the 1950s and onward to the 1970s, a number of global conferences and working meetings on the environment and integrated water management were chaired by the United Nations. The starting meeting on the issues of water was the Stockholm Conference on the Human Environment in 1972. Since 1972, the UN has been arranging global conferences on water and the environment every ten years. A number of other UN conferences focusing on water resources issues have further informed this development. Ray (2008) emphasizes the need for 'riparian international law' to deal with trans-boundary water issues which are considered crucial for many countries including Bangladesh. The UN has been playing a critical role in promoting basin wide water resources management through 1997 UN Convention on Non Navigational Uses of Water (Ray, 2008). It is widely acknowledged that it is essential to have Integrated River Basin Management (IRBM) in implementing IWRM in many parts of the world as 'two are complementary, strongly interrelated, and both aim at wise water governance' (John-Clausen, 2004, p.18). The following discussion provides an overview of the key conferences on water issues.

2.5.1 UN Water Conferences from Mar del Plata, Argentina in 1977 to International Conference on Freshwater, Bonn in 2001

The Mar del Plata Conference on Water (UN, 1977)

This Conference has been recognised as the first and only inter-governmental conference devoted exclusively to water (World Water Council, 2003); a remarkable fact given the international significance of water and the emerging potential for conflict over trans-boundary water resources (Bosnjakovic, 2000). This potential was recognised even in 1977 with the objective of the Mar del Plata conference 'to promote a level of preparedness, nationally and internationally, to help the world avoid a water crisis of global dimensions by the end of the present century' (Biswas, 2004b). The conference produced an action plan consisting of resolutions on a wide range of subject areas and recommendations covering the essential components of water management, including:

- Water resource assessment; Water use and efficiency;
- Environment, health and pollution control;
- Policy, planning and management;
- Natural hazards;
- Public information, education, training and research, and
- Regional and international cooperation.

Rahaman and Varies (2005) argue that the Mar del Plata Conference has been a success story as there was active participation from developing countries and a wide range of water issues were discussed. This conference played a critical role in further developing the idea of IWRM. However, Biswas (2004b) pointed out that there were concerns as no discussion was

held on the issues of trans-boundary water management, which is a vital issue to ensure further progress of IWRM.

Dublin Conference on Water and the Environment (UN, 1992)

Five months prior to the Rio World Summit, a smaller convention focusing on the issue of global water resources sustainability took place in Dublin (International Conference on Water and Environment [ICWE], 1992). Participants from one hundred countries and representatives of eighty international, intergovernmental and non-governmental organisations attended the conference. The emerging picture of global water resources was perceived to be critical, real and immediate. The conference concluded (ICWE, 1992):

> The future survival of many millions of people demands immediate and effective action. The Conference participants call for fundamental new approaches to the assessment, development and management of freshwater resources, which can only be brought about through political commitment and involvement from the highest levels of government to the smallest communities. Commitment will need to be backed by substantial and immediate investments, public awareness campaigns, legislative and institutional changes, technology development, and capacity building programmes. Underlying all these must be a greater recognition of the interdependence of all peoples, and of their place in the natural world. (p. 1)

Of four principles highlighted by the conference (ICWE, 1992), emphasis was placed on effective participation of the general public:

> The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects. (Principle 2)

Various action programmes were recommended for implementation by investment in ICWE (1992):

- The enabling environment: Development of capital projects and restoration of the natural environment;
- The knowledge base: Development of water resource science through measurement and modelling of components of the water cycle, environmental and climatic conditions, and
- The human resource base: Capacity building through training of personnel, development of institutional and legal arrangements, and public education. (p. 5)

These assessments were communicated to the United Nations Conference on Environment and Development to ensure a 'proper emphasis' on global water issues (Grover and Biswas, 1993). However, organisers of the Dublin conference later admitted that 'UNCED failed to attach much priority or urgency to water issues. The freshwater chapter in Agenda 21 … reflects no substantive inputs from the Dublin Conference' (Grover and Biswas, 1993, p.81), a failure that has arguably resulted in considerable fragmentation of the United Nations water resources agenda (Biswas, 2004b).

International Conference on Freshwater, Bonn, 2001

Preceding the World Summit on Sustainable Development at Johannesburg in 2002 and the third World Water Forum held in 2003 at Kyoto, in close cooperation with the UN, the Government of Germany hosted the International Conference on Freshwater held on 3–7 December 2001 in Bonn. Around 700 delegates from more than 170 countries attended the Conference with the theme 'Water a Key to Sustainable Development'. The main objectives of the Conference were to contribute to the solutions of the global freshwater problems, support the preparations of the 2002 World Summit on Sustainable Development and the Third World Water Forum held at Kyoto in 2003 (Government of Germany, 2001).

The Conference dealt with the pressing issues related to water management. Among those the key question was what needs to be done to reach the targets of MDGs by 2015 (Government of Germany, 2001). The Conference facilitated the raising of the political as well as public awareness of the issue of water security for the needy first – the poor.

The Conference deliberated on many issues such as water security, governance, gender, trans-boundary water issues, MDGs and integrated water resources management, amongst others. The Conference adopted the 5 key issues of the water sector called 'The Bonn Keys' (Government of Germany, 2001):

- The first key is to meet the water security needs of the poor;
- Decentralization is the second key. The local level is where national policy meets community needs;
- The key to better water outreach is new partnerships;
- The key to long-term harmony with nature and neighbour is cooperative arrangements at the water basin level, including across waters that touch many shores, and
- The essential key is stronger, better performing governance arrangements. (p. 22)

2.5.2 1987 World Commission on Environment and Development: The Brundtland Report

Following a general assembly of the United Nations in December 1983, an independent commission, the World Commission on Environment and Development, was established to formulate 'a global agenda for change' towards international co-operation in environmental management (World Commission on Environment and Development, 1997). The central focus of that agenda was not merely effective environmental and economic management, by this time referred to as 'sustainable development', but included an emphasis on re-establishing multilateral international relations in the increasingly fragmented world of the late Cold War. The report of the World Commission on Environment and Development, entitled *Our Common Future*, refers to a 'global commons' (World Commission on Environment and Development, 1987, p.261), or those parts of the planet that fall outside of national jurisdictions, which can only be managed through international co-operation. This report has been very influential on subsequent environmental policy worldwide.

With such an internationalist agenda, it is perhaps un-surprising that the World Commission on Environment and Development report contains only one passing reference to 'a political

system that secures effective citizen participation in decision-making' (World Commission on Environment and Development, 1997). However, given the attempt to articulate conceptual guidelines for institutional change at a national level, and the subsequent influence of the report on national policies, the neglected relationship between national and local institutions may be regarded as a missed opportunity.

The World Commission on Environment and Development report emphasises the need for recognition of global risks and effective risk management, particularly in relation to nuclear technology, international security and climate change. Again, the limited policy detail in relation to uncertainty may be regarded as a missing link between the national and local levels. Rahaman and Varies (2005) contended that '… the Brundtland Commission Report (World Commission on Environment and Development, 1987), which laid the cornerstones to the concept of sustainable development in international policy, hardly addressed the issue of water.'

The World Commission on Environment and Development report is widely quoted for its original definition of sustainable development: 'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1997). This definition has been criticised for its lack of detail in practical terms. In general, the limited practical applicability of the World Commission on Environment and Development's work on stakeholder participation, risk management and sustainable development overall, is a criticism that could be directed at all the conferences and working processes of the United Nations up to this point (Dryzek, 1997).

2.5.3 1992 Rio World Summit on the Environment and Development

Between 1987 and 1992, an enormous effort to provide detail in international environmental policies culminated in the 1992 World Summit on the Environment and Development in Rio de Janeiro, Brazil. In particular, the issues of scientific uncertainty and ecological risk management emerged as significant factors in environmental politics, partly due to the maturation of risk assessment and risk management methodologies around that time. This was acknowledged in the 1992 Rio Declaration on the Environment and Development in a statement known as the Precautionary Principle (United Nation Conference on Environment and Development, 1992):

> Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation. (Principle15)

The 1992 Declaration also advances the principles of environmental impact assessment as 'a national instrument' (United Nation Conference on Environment and Development, 1992) and reaffirms the 1982 Charter's emphasis on participation by members of the public:

> Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information … and the opportunity to participate in decision-making

processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided. (Principle10)

2.5.4 World Summit on Sustainable Development, Rio + 10, Johannesburg, 2002

The 1992 Rio Conference was acclaimed for its innovative and ambitious goal of establishing global and local partnerships for sustainable development. Between 1992 and 2002, progress towards this goal was disappointing as poverty continued unabated along with environmental degradation. The Johannesburg World Summit on Sustainable Development of 2002, 'Rio+10', produced no new agreements or treaties and was arguably set back by the politicised resistance of the United States and Australia, normally leading partners in environmental policy. Annan (2002) warns that the global consensus seemingly forged through the 1987 publication of *Our Common Future* and the 1992 Rio Earth Summit has not been sufficient to change the 'business as usual' attitudes of the west.

It is difficult to judge the outcomes of the 2002 Rio Conference on the basis of written documents. Much of the work took place in low profile meetings producing their own documentation (Essaw, 2008). The local government sessions, representing progress on Local Agenda 21, provide a glimpse of activities at the conference. These sessions highlighted local initiatives to protect the global commons and achieve sustainable development, particularly in the areas of water management and climate protection, but, no sense of unified resolution emerges: rather, numerous different written goals for local governments worldwide, reflecting no active partnership across states, appear to be the outcome. From another viewpoint, however, it can be seen that by 2002 the principle framework agreements and policies for global environmental management were already in place or under detailed negotiation. The objective of the 2002 Summit was to track implementation projects rather than to create new objectives, and it should not be judged by the absence of resounding declarations of principle. The test of the 2002 Summit will be success at meeting implementation targets, such as significant reductions in rates of biodiversity loss by 2010 and improvements in access to basic sanitation by 2015.

World Resources Institute (2004) also points out that delivering 'Environmental Governance' through converting the rhetoric of the declaration pronounced in these Summits into real actions is a challenge given the existing government institutions and economic policies.

Despite the criticism it is widely acknowledged that the United Nations has been playing a significant role in promoting critical issues such as sustainable development, sustainability of water resources, poverty alleviation, MDGs, women empowerment and participation. Effective planning and efficient management of water resources require all these factors to be considered in an integrated way.

The Mar del Plata Conference on Water in 1977 recognised the need for international cooperation in water management to tackle global water crisis. This Conference adopted an 'Action Plan' to deal with water through IWRM. Developing countries were represented. The1992 Dublin Conference was another significant event in the context of global water issue where four basic principles in respect of water management were adopted, the 'Dublin Principles'. The International Conference on Freshwater in Bonn in 2001 considered water as

a critical resource for sustainable development. The Conference acknowledged the importance of effective water governance for achieving MDGs. The Conference adopted 5 key elements for water resources management, as the 'Bonn Keys'. Though the Bruntland Report is widely known as a seminal work on sustainable development, it failed to acknowledge water as an important element for sustainable development (Rahaman and Varies, 2005). UN Summits such as 1992 Rio World Summit and World Summit on Sustainable Development in 2002 produce important agreements and declarations with certain mechanism to achieve IWRM. However, implementing those intentions is a real challenge for many countries (World Resources Institute, 2004)

There is criticism that the UN has not been able to play its due role as a forerunner for implementation of IWRM. However, the UN has put forward promotion of water governance discourses in the global scale through influencing 'procedural aspects' such as legitimacy, accountability, efficiency, awareness etc., whereas it could not contribute in the improvement of output of effective water governance such as institutions building and strengthening financial resources (Baumgartner and Pahl-Wostl, 2013). The UN bodies can play a role in mediating in forging gaps between different stakeholders of water management for ensuring sustainable water management. Baumgartner and Pahl-Wostl (2013) argue that the 'supernatural' role of the UN in the global water governance could be strengthened. The UN has been also acting from the background to move forward good water governance through other international water bodies such as GWP, WWC etc. and role of these institutions will be analysed in the following section.

2.6 OTHER INTERNATIONAL INITIATIVES

During the period from 1972 to 1992, global inter-governmental discussions concerning water resources were almost exclusively conducted through the auspices of the United Nations. However, Biswas (1999) notes that since 1992 a generation of competent and dedicated water industry leaders have left the United Nations and not been replaced, resulting in a decline in the relevance of the UN in global water discussions.

After 1992, water resources professionals worldwide expressed concern at the declining relevance of water resources management in global environmental policy (Abu-Zeid and Lum, 1997; Biswas, 1999; Grover and Biswas, 1993). A number of international water resources organisations, whose role formerly was limited to professional activities, have responded to this decline by promoting new international and inter-governmental fora in water resources management, with new forms of international communication and co-operation that are parallel to, if not necessarily independent of, the UN. Such inter-professional (as opposed to inter-governmental) groupings have continued the development of social and management policies relating to water resources (Mysiak et al., 2010).

2.6.1 International Water Resources Association (IWRA) and World Water Council (WWC)

International Water Resources Association

The International Water Resources Association (IWRA), founded in 1971 as an international offshoot of the American Water Resources Association (AWRA), has been a leading proponent of this international effort. The IWRA have been instrumental in the formation of the Committee for the World Water Council (WWC) at the Eighth World Congress (in Cairo, 1994) that was first envisaged at the Mar del Plata conference in 1977. The WWC was finally established in 1996 and has since instituted a triennial conference, the World Water Forum, the objectives of which are to raise the awareness of world leaders and decision makers with respect to global freshwater issues, and to define the vision for global freshwater management into the 21st century (Ait-Kady, Shady, and Szollosi-Nagy, 1997).

Following the inaugural World Water Forum in 1997, the World Water Council established an independent commission, known as the 'World Commission for Water (WCW) in the 21st Century', to carry out investigative and policy tasks formerly associated with commissions established by the UN. Co-sponsors of the Commission include the Food and Agriculture Organisation (FAO), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organisation (UNESCO), United Nations Children's Fund (UNICEF), the United Nations University (UNU), World Health organisation (WHO), World Meteorological Organisation (WMO), and the World Bank.

The Commission submitted its Report to the Second World Water Forum held in The Hague in March 2000 entitled, 'A Water Secure World-Vision for Water, Life, and the Environment,' with a comprehensive analysis of many aspects of water. The Commission concisely presented the urgency to manage the scarce water resources in an effective way with a summary of the investigations on four key areas: policy, institutions, research and investments (World Water Commission, 2000). The Commission put forward the following actions to be taken to manage water resources for a 'water secure world':

- Holistic, systemic approach;
- Participatory institutional mechanisms;
- Political commitment, and
- Behavioural change.

The Commission also suggested that IWRM should be a 'philosophical approach based on participation, full cost water pricing, private sector involvement, and respect for the integrity of ecosystems'.

The World Water Council

The World Water Council (WWC) claims to be an 'international water policy think tank' but critics say that the role and activities of this organisation are beyond that (Barlow, 2007). The World Bank and the UN are the main sponsors of the WWC, which enjoys a position to

advance the interests of the private sector water agencies in different countries around the world as most of its members are private corporations (Barlow, 2007).

The World Water Council held its founding meeting in Marrakesh, named as the First Water Forum Marrakesh 1997. The conference noted the urgent need for a better understanding of all the complex issues that must go into shaping an international water policy for the next millennium. It called upon the world community to work together to put into practice the *Mar del Plata Action Plan* and the *Dublin Principles* as well as Chapter 18 of the Earth Summit on freshwater resources. It also mandated the WWC to prepare a global vision for water, life and the environment. This Forum paved the way for an international conference to be held every three years, where water professionals from different regions of the globe, as well as organisations, agencies and institutions would meet to discuss and try to agree on ways of dealing with the pressing problems facing the world community in the water resource sector.

The WWC has been sponsoring large forums every three years since the Second Water Forum 2000 was held in The Hague. Unlike Dublin, The Hague conference considered the outcomes of previous water initiatives and acknowledged water's social, environmental and cultural values. The four IWRM principles as mentioned earlier were put on the political agenda and the conference endorsed active participation of the developing world's water stakeholders (Rahaman and Varis, 2005). One key element that featured prominently was that many water professionals opposed privatisation, arguing that the water sector is interrelated with many functions that demand government presence (food control, drought alleviation, water supply and ecosystem conservation) (Shen and Varis, 2000). The Forum resulted in a sharp polarisation of the views of the professional water organisations on the issues of dams and the role for the private sector participation, resulting in a widening of the gap on those issues.

The declaration was clearly a political statement devoid of commitment or specific actions or plans that could be monitored or measured (Salaman, 2003). The Ministers and Heads of Delegation claim they lacked the authority to make any commitment on behalf of their governments, including authority to endorse the vision and plan of action of the World Commission for Water, the WWC and the GWP (Salaman, 2003). The declaration failed to recognise water as a human right; rather it only insisted that it is a 'human need,' which was criticised, as the delivery of the outcome of the meeting was influenced by private corporations through their representatives as government delegates (Barlow, 2007).

The Third World Water Forum held in Kyoto, Japan in 2003 recommended IWRM as the way to achieve sustainability regarding water resources. It promised technical and financial support to enable developing countries to achieve the UN Millennium Development Goals and in developing IWRM and water efficiency plans in all river basins worldwide by 2005 (Rahaman and Varis, 2005).

The Fourth World Water Forum was held in Mexico in March 2006 where a wide range of issues related to water including integrated water resources management was discussed and exhaustive recommendations made at the global and local level to manage water resources. In respect of IWRM, the forum could achieve a significant consensus among the key stakeholders to implement IWRM. The Forum's outcomes in respect of IWRM have been

summarised by a panel of experts, and are altruistic and visionary. These outcomes include (World Water Council, 2006):

- A good degree of consensus on IWRM's theoretical principles and policy objectives;
- Emphasising the goals: IWRM is a vehicle for social equity and cohesion, democratisation, national unity, peacekeeping and sustainable development;
- Lacks universal blueprints for IWRM, only road maps leading to different outcomes;
- Building a 'Cooperative Socio-political Governance' for IWRM is a shared responsibility between the State and Civil Society;
- Deliberative Multi-stakeholder Institutions for IWRM are promising spaces for an empowered and democratic water politics;
- Fully-fledge institutionalisation of inter-agency cooperation is a way out from isolation to policy integration, and
- Groundwater Resources Management should be coupled with IWRM processes. Local water polities should make efforts to gradually establish this relationship explicitly in IWRM plans and throughout the policy process.

2.6.2 Role of the Global Water Partnership (GWP)

Although it is widely understood that water should be holistically managed, it was not until the Dublin Conference on Water and the Environment in 1992 and the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 that a more comprehensive approach to water management was judged necessary for sustainable development. This awareness, together with the need for participatory institutional mechanisms related to water, called for a new coordinating organisation. In response to this demand, the World Bank, the United Nations Development Program (UNDP) and the Swedish International Development Agency (SIDA) created the Global Water Partnership (GWP) in 1996.

The Global Water Partnership is a working partnership among those involved in water management: government agencies, public institutions, private companies, professional organisations, multilateral development agencies and others committed to the Dublin–Rio principles.

Today, this comprehensive partnership actively identifies critical knowledge needs at global, regional and national levels, helps design programmes for meeting these needs, and serves as a mechanism for alliance building and information exchange on integrated water resources management (GWP, 2003).

The mission of the Global Water Partnership is to 'support countries in the sustainable management of their water resources'. The GWP's objectives are to (GWP, 2007):

- Clearly establish the principles of sustainable water resources management and identify gaps and stimulate partners to meet critical needs within their available human and financial resources, and

- Support action at the local, national, regional or river basin level that follows principles of sustainable water resources management and help to match needs to available resources.

This initiative was based on promoting and implementing integrated water resources management through the development of a worldwide network that could pull together financial, technical, policy and human resources to address the critical issues of sustainable water management.

It is clear that IWRM principles are being followed up by these international water bodies to more effectively manage the water resources. IWRA, WWC and GWP have been relentlessly pursuing the promotion of effective water governance in all countries, with particular emphasis on poor countries, to achieve MDGs. Given the recent alarming situation arising from climate change impact on water resources, global cooperation in this very vital sector is essential. Contributions of these organisations towards developing nations might accelerate the pace of implementation of IWRM. UN agencies as well as these international agencies can identify the areas of cooperation in respect of water resources management particularly for developing nations.

2.7 A REFLEXIVE APPROACH TO WATER GOVERNANCE

The foregoing discussion elaborates that IWRM is a continuous process, which has evolved over time. Implementation of IWRM depends on the community or the country concerned. IWRM is also a political process, which has social, economic and environmental implications. Water governance needs a matrix of political, social, economic and administrative systems. Effective water governance requires building institutional linkages with improved accountability and transparency. Environmental, social and economic sustainability of water resources is crucial in achieving MDGs, food security and tackling climate change. Reflexive water governance can deliver IWRM principles to attain these developmental targets (Schutter and Lenoble, 2010).

2.7.1. Definition of Reflexive Governance and other important terminologies

Though briefly an introduction of the reflexive governance has been given in the previous section (section 1.2), it would be useful to develop a concise and coherent definition of the ‘reflexive water governance’ as well as to provide brief accounts of other terminologies such as ‘adaptive water management’, ‘good water governance’, ‘transboundary water management’ and ‘integrated river basin management’.

Reflexive water Governance

Voss and Kemp (2006) argue in their paper “Reflexive Governance for Sustainable Development-Incorporating feedback in social problem solving”, there are six stages for addressing sustainability such as : 1) integrated knowledge production, 2) experiments and adaptivity of strategies and institutions, 3) iterative, participatory goals formulation, 4) anticipation of long-term systemic effects of measures (developments), 5) interactive strategy development, and 6) creating congruence between problem space and governance. It reflects that there is a clear intent for learning and adapting as an integrated and systemic process.

Reflexive governance tends to be deliver things in a participatory way with experimentation which also promotes collective learning (Voß, and Bornemann, 2011). Voß, and Bornemann (2011) argue that reflexive governance has two types of designs such as Adaptive Management (AM) and Transition Management (TM). A reflexive governance approach is considered as having potential benefit for the improved management of water resources in line with IWRM principles. Reflexive water governance in general has the some key points that characterise good governance as also presented earlier such as openness, participation, accountability, transparency, effectiveness, coherence and a learning oriented framework. To deliver good water governance government and its institutions, civil society as well as other stakeholders needs to work together. An effective water management may ensure IWRM. Reflexive water governance also deals with elements such as political, economic, social and administrative processes which are quite important to achieve people's aspirations and articulation. As argued earlier that reflexive water governance may bring tangible outcomes in the water sector such as, equity, sustainability, legal rights, and institutional linkages, improvement of policy coherence, and transparency in decision making process which ultimately ensure learning.

Adaptive water management

Bormann *et al*. (1994) defined it "Adaptive management is learning to manage by managing to learn". Adaptive capacity refers to "the ability of a socio-ecological system to cope with novelty without losing options for the future" (Folke, Hahn, Olsson and Norberg, 2002) and "that reflects learning, flexibility to experiment and adopt novel solutions, and development of generalized responses to broad classes of challenges" (Walker *et al*., 2002). Norton (2005) argues that adaptive management got the philosophical root from the ideas of Aldo Leopold-a philosopher of first half of 20th century and first used by Holling (1978) this term which has now widely used by managers in the field of environment and ecosystem. Norton (2005) argues that environmental aspects should be dealt with the experimentalist framework of an adaptive management process which can fit in the issues in an effective way. Pahl-Wostl (2007) points out that "water management must become more flexible and responsive to change to be able to cope with increasing uncertainty". Pahl-Wostl (2007) suggests that to face the challenges of implementation of IWRM, 'adaptive water management' under uncertainty would be suitable. "Adaptive Management embeds uncertainty as fundamental principle in the management approach (Gunderson, Holling and Light 1995). It is perceived that there are difficulties of realizing the promise of adaptive management in natural resource management and biodiversity conservation (Lee 1999). Walters and Holling (1990) emphasized the organizational and human dimensions of learning while doing. A critique from insiders as well as NGOs, managers, and others for whom the uncertainties of the natural world imply opportunity as well as concern is required to demonstrate that in reality adaptive management works.

Good water governance

It is perceived that 'good water governance' is a state of management of water resources which involves all stakeholders with an appropriate mechanism to have the right to be heard, to participate in the decision-making process and to question
certain decisions involved with the service provisions.

Transboundary water management

The definition of a transboundary water management is managing water in a basin level with different states and or regions which captures different socio-ecological systems (Patrick and Turton, 2006). The governance of transboundary river basins encompasses the full range of water management approaches. This is required for riparian states where water is scrae resources. Patrick and Turton (2006) argue the importance to put in place a mechanism for transboundary water management:

> Transboundary water resource management is not only a necessity due to the number of river basins that cross international borders but is also driven by co-operation between states for the common good of improving the quality of lives of those communities that live in shared river basins. The acquisition of knowledge in the field of transboundary water resource management must therefore aspire to climb such a level that can reach the point of understanding and ultimately wisdom if it is to fulfil its mandate of improving the quality of people's livelihoods. Research and policy development in this field therefore needs to be applicable and socially relevant. (p. 7)

Integrated river basin management

Integrated river basin management (IRBM) as cited in the web page of WWF (http://wwf.panda.org/about_our_earth/about_freshwater/rivers/irbm/) is the process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximise the economic and social benefits derived from water resources in an equitable manner while preserving and, where necessary, restoring freshwater ecosystems (GWP, 2000).

WWF narrates (http://wwf.panda.org/about_our_earth/about_freshwater/rivers/irbm/) the following ways to have a successful integrated river basin management:

- A long-term vision for the river basin, agreed to by all the major stakeholders.
- Integration of policies, decisions and costs across sectoral interests such as industry, agriculture, urban development, navigation, fisheries management and conservation, including through poverty reduction strategies.
- Strategic decision-making at the river basin scale, which guides actions at sub-basin or local levels.
- Effective timing, taking advantage of opportunities as they arise while working within a strategic framework.
- Active participation by all relevant stakeholders in well-informed and transparent planning and decision-making.
- Adequate investment by governments, the private sector, and civil society organisations in capacity for river basin planning and participation processes.
- A solid foundation of knowledge of the river basin and the natural and socio-economic forces that influence it.

Takacs (2010) argue that Integrated River Basin Management (IRBM) is a long term solution for Bangladesh in achieving water sustainability. Shahjahan (2008) suggests that tackling

disaster management and climate change through effective water management Bangladesh needs regional cooperation to implement integrated river basin man framework.

2.7.2 Various Components of Reflexive Water Governance

The United Nations and other international bodies have a significant role to play in effective planning and efficient management of water resources. This international dimension is to be considered for designing effective water governance systems to deliver IWRM principles. This global cooperation through international agencies is urgent given the climate change impact on water resources.

Keeping these issues in view, for achieving IWRM principles in countries like Bangladesh a reflexive governance approach would be devised.

Earlier, in Figure 2.2, the three pillars of IWRM were presented, where Jonch-Clausen (2004) argued that these pillars must be in place to implement the IWRM process in a country. IWRM focused on these three pillars and aimed at avoiding a fragmented approach of water resources management by considering (Jonch-Clausen, 2004):

- An enabling environment of suitable policies, strategies and legislation for sustainable water resources development and management;
- Putting in place the institutional framework through which to put into practice the policies, strategies and legislation, and
- Setting up the management instruments required by these institutions to do their job. (p. 16)

These three pillars were focused on delivering a balance between 'water for livelihood' and 'water as a resource'. What is missing from these three pillars is the international dimension. In case of Bangladesh if all three pillars were present it would still be difficult to achieve IWRM if there is lack of international cooperation, as the country has 54 common rivers which flow from neighbouring India (Ahmad, 2003, p.274). A similar scenario is present for many other countries with common rivers.

The governance issue, including water governance relates to many factors. Meppem, Bellamy and Ross (2005) argue that contemporary governance requires the following elements, which are termed as 'enabling institutional arrangements':

- Clear agreement on the roles and responsibilities of all actors involved;
- Clarification of powers, functions, and linkages required to ensure that the cross-jurisdictional governance system is compatible with community aspirations;
- Support of inclusive, open, and collaborative forums that facilitate processes of deliberation in which networking, exchange of information, social learning, and negotiation can take place;
- Fostering of organizational/agency cultures that support community participation and are attentive to the need for change management, and
- Attention to both individual and collective/community capacity-building. (p. 112-113)

Further, to explain the governance of water resources, in the case of a river, Meppem et al. (2005) propose a model of an 'effective and adaptive water governance system' (Figure 2.3). This model is also supported by a study of catchment management in Australia where the elements of NRM in practice were examined (Bellamy, Walker, McDonald, and Syme, 2001).

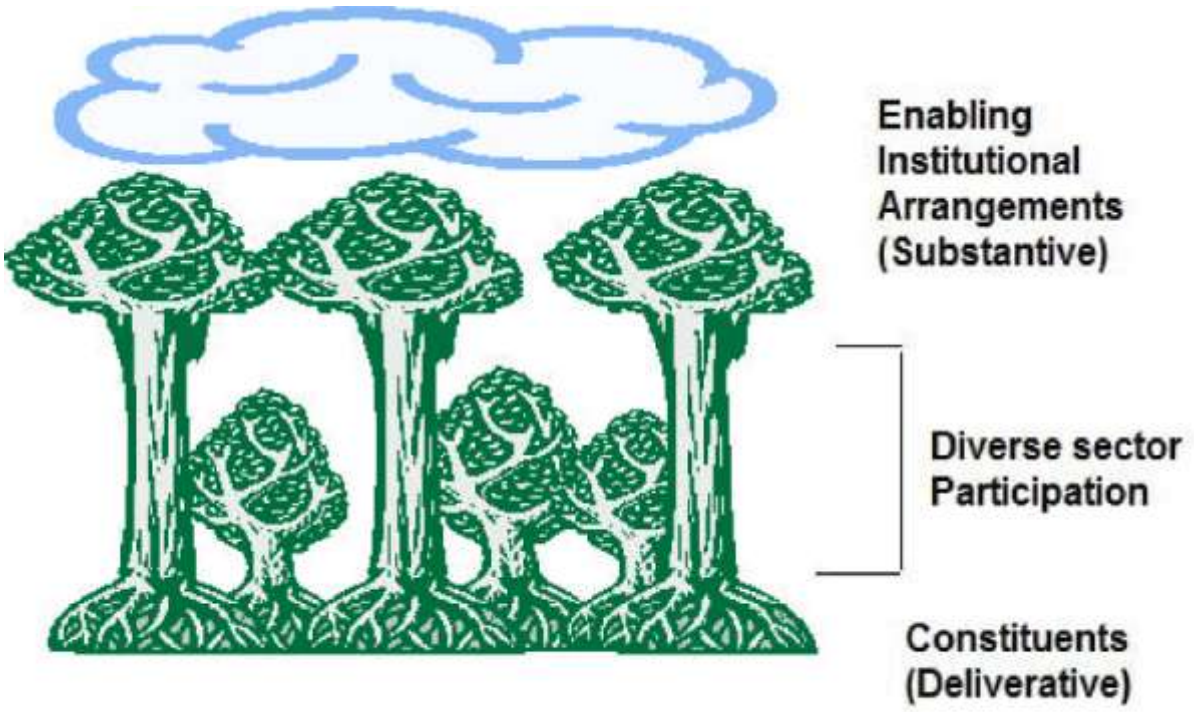

Figure 2.3: Effective and Adaptive Water Governance System, Source: Adapted from Meppem et al. (2005).

The core elements of the governance style presented by Meppem et al. (2005) such as enabling institutional arrangements, stakeholders' participation and deliberative processes through open and inclusive institutions need to be incorporated in the proposed new governance approach presented in the current study. It has been found that for effective water governance there should be enabling institutional framework, active participation by stakeholders and inclusiveness (GWP, 2003). The main components of the proposed approach and their inter-relationship are now presented briefly.

Sustainability

One of the objectives of IWRM is to achieve sustainable water resource management. In the proposed water governance approach in this thesis it is mentioned that under sustainability

there should not only be environmental sustainability but two other aspects must also be catered to—social and economic sustainability. Economic sustainability means that in the long term, water resources should be sustainable in terms of economic value (Cap-Net and UNDP, 2008). Similarly, social sustainability means water should be sustainable in terms of its social value and social inclusion including gender mainstreaming in the water sector (Ahmed, 2008). To enhance the water security in the South Asian Region including Bangladesh sustainable development of water resources is needed (UNEP and Development Alternatives, 2008).

Institutions

The term 'institution' has been widely used in social sciences. It would be useful if a definition of the term is given. Hodgson (2006) defines the term as:

> Institutions are the kinds of structures that matter most in the social realm: they make up the stuff of social life. The increasing acknowledgement of the role of institution in social life involves the recognition that much of human interaction and activity is structured in terms of overt or implicit rules. Without doing much violence to the relevant literature, we may define institutions as systems of established and prevalent social rules that structure social interactions. (p.2)

Institutions are vital to implement policies and legislation. In this water governance approach, 'institutions' is one of the components for water governance. It is also presented that the institutions dealing with water issues should be participatory, inclusive, open and integrative, as it is well known that these attributes are crucial for reflexive water governance (Rogers and Hall, 2003).

IWRM recognises that water is a scarce natural resource, subject to many interdependencies in conveyance and use. Kidd and Shaw (2007) argue that an 'understanding of the integrated nature of the natural system is a prerequisite for the development of water-sensitive institutional structures and activities' (p.315). Jonch-Clausen (2004) argues that integration should take place both in the natural system as well as human system. Figure 2.4 illustrates this in the context of the three pillars of IWRM.

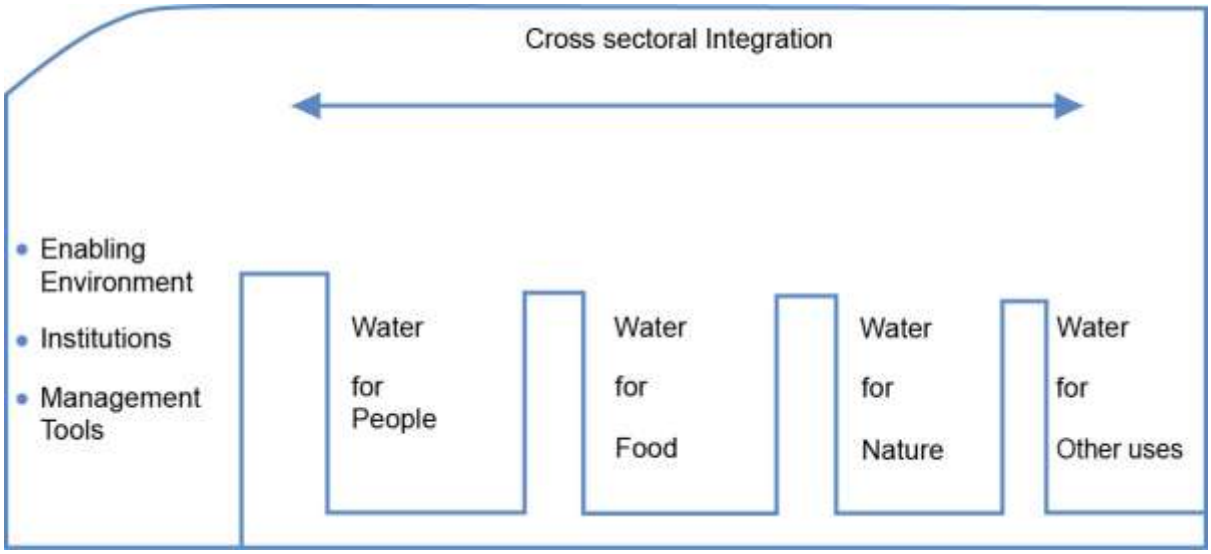

Figure 2.4 Cross-sectoral Integration of Water Resources, Source: Based on Jonch-Clausen (2004).

Critical Factors

In this water governance approach, some critical factors in achieving IWRM have been identified. These are climate change including disaster management; poverty; gender, food security and water pricing. Each of these factors has a bearing on water management (Fisher and Cook, 2010; Dukhovny and Ziganshina, 2011). These factors are especially crucial in managing water in developing countries like Bangladesh (Chadwick and Datta, 2001a; Ahmad, 2003). It is a reality that climate change has an effect on water resources and on the well being of the society and requires adaptation and investment for efficient water management (Jaraud, 2008; GWP, 2009; Fisher and Cook, 2010). Jaraud (2008) also argues that:

> ..impacts of the climate-induced risks will tend to offset the progress being made to meet the MDGs by 2015, since their effects will work against achievement of the respective targets, particularly in terms of food security, sustainability of water resources, human health and the reduction of poverty. (p. 3)

Jarraud (2008) further argues that IWRM is one way to tackle climate change and other critical issues related to water resources. He states:

> Re-examination and updating of development strategies for land and water resources is fundamental along with economic planning to take account of the expected impacts of climate change, especially through approaches such as integrated water resource management, integrated flood management or watershed management. (p. 8)

Water pricing has been identified as very important in delivering IWRM in countries like Bangladesh (GOB, 1999). In mainstreaming sustainable cost recovery in IWRM Plans (for instance), there are two recommendations (Cap-Net and UNDP, 2008):

- Service providers should aim for revenues sufficient to cover recurrent costs, and should develop sustainable long-term cost recovery policies, and
- Revenues from charges should be covered by users as a group (Cap-Net and UNDP, 2008).

Cap-Net and UNDP (2008) argue that many past failures in IWRM are attributable to ignoring full cost recovery.

Legal and International Dimensions

A functioning legal regime is required for an effective water governance to adapt and reform for the sustainability and better management of this finite resource (Olleta, 2010). It is well recognised that states play a critical role in materialising the emerging concept of human right to water, conservation of water and ensuring supply of safe and clean water to the citizens. These objectives cannot be achieved without enacting appropriate legislation to manage water resources (Olleta, 2010). There exists an important linkage between water governance and the legal regime of water management as Olleta (2010) argues:

> An optimal management of water resources and efficient delivery of water services are only possible if clear rules are enacted, efficient institutions put in place, stakeholders given the chance to participate in the sector and the exploitation of the resource done in a way that is respectful to the environment. (p. 35)

Globally water sector reforms are putting an emphasis on the development of water laws and regulations, though the change of legal regime in the water sector has not received adequate attention (Cullet, Gualtieri and Madhav, 2010). Cullet et al. (2010) present a detailed account of the need for putting in place a robust legal framework governing the critical resource-water at local, national and international levels.

Zodrow (2010, p. 37) argues that 'despite the large number of existing legal instruments, the international legal system is still fragmented and not comprehensive'.

International legal instruments which are important are the UN Watercourse Convention of 1997 and the Helsinki Convention of 1992 and its protocols. Though the Convention of 1997 is not in force, the parties have begun to apply and adjust the Convention and this is the only global freshwater agreement in place (Zodrow, 2010). The Convention of 1997 is based on three fundamental principles-equitable and reasonable use, no significant harm and exchange of information and notifications. However, the Convention lacks attention to human rights to water and environmental perspectives. The Helsinki Convention of 1992 has two protocols-Protocols on Water and Health of 1999 and Protocol on Civil Liability and Compensation for Damage caused by the Transoundary Effects of Industrial Accidents on Transboundary water of 2003 (yet to be in force). The Helsinki Convention has principles of precaution, polluter pays and inter-generational equity. The Convention also mandates states to have bilateral or multilateral agreements on use of trasnboundary waters.

Zodrow (2010) highlights the importance of soft law instruments in shaping international law in water resources, particularly the Dublin Principles of 1992, Bonn Ministerial Declaration of 2001, Berlin Rules on Water Management of 2004 developed by International Law

Association, London. Zordov (2010) narrates different dimensions of freshwater having implications at international level such as environmental, economic and trade, human rights, conflict and governance dimensions. The international aspects of water laws have a bearing on water governance (Zodrow, 2010). IWRM and international legal regime are interlinked as Zodrow (2010) points out that these international 'legal instruments and principles' can facilitate implementation of IWRM:

> ...the new notion of a holistic approach to water management as, for example, incorporated in IWRM will only provide a basis for fair, equitable and sustainable water services for all if equally reflecting all dimensions of water and if supported by a comprehensive international legal framework on the basis of the instruments and principles...' (p. 58)

There is a need for international cooperation for water management. The UN, Global Water Partnership and World Water Council are three prominent international organisations in the field of water. Bangladesh is a lower riparian country in the region of South Asia with more than 54 rivers in common with India alone. Integrated River Basin Management (IRBM) is now considered as a necessary means for conflict resolution and cooperation in international river basins (Shahjahan, 2008). There is also growing demand for international conventions and laws to be implemented to safeguard the interests of countries like Bangladesh to have a 'equitable and reasonable share' of water resources in the common basin (Fisher, 2009).

It is pertinent here to highlight the findings of a report by the International Water Association in collaboration with the UNEP, where the following six obstacles were found in the implementation of IWRM (IWA/UNEP, 2002 as cited in Jeffrey, 2006):

- The lack of understanding of and attention to the positive contribution that innovative workplace approaches can play in achieving IWRM objectives;
- The potential complexity of the IWRM concept;
- The need for reference projects;
- The lack of adequate skills, expertise and awareness;
- The lack of adequate and reliable data, and
- Gaps in available knowledge and technology. (p. 6)

2.7.2 Proposed Water Governance Approach

It is evident from the previous discussion on the concepts, rhetoric, politics and application of IWRM in water management that it has implications in tackling poverty, gender and sustainability aspects of a particular country. IWRM outcomes can play a crucial role in these aspects as well as helping to achieve the targets of MDGs. International organisations such as the United Nations, World Water Council and Global Water Partnership provide significant leverage on the implementation of IWRM in different countries, particularly in the developing countries like Bangladesh.

In 2003 the Global Water Partnership conducted an informal stakeholder baseline survey to assess the status of water sector reform processes towards more sustainable water management practices. This was to help evaluate IWRM's implementation in 108 countries –

45 in Africa, 42 in Asia and the Pacific, and 21 in Latin America. The assessment was based on policies, plans/strategies and other planning documents prepared in the 108 countries. The result indicated that about 10 per cent of all countries surveyed had made progress towards a more integrated approach and a further 50 per cent had taken some steps in the direction but needed to increase their efforts. The remaining 40 per cent were at the initial stages of the process (GWP, 2004). However, little is known in terms of the governance structure put in place and the processes adopted for the integrated approach. The survey assessments made reflect the best judgment of senior professionals drawing on the accumulated information available within the Global Water Partnership networks at the regional and country levels.

Another survey was carried out in November/December 2005, providing a basis for reporting to the Fourth World Water Forum in Mexico in March 2006. The survey focused on policies, laws, plans/strategies and other planning documents in 95 countries, to assess whether they had initiated measures to strengthen water resource management. The survey also assessed whether those nations had included IWRM elements in their policy documents (GWP, 2006). The results indicated that approximately 21 per cent of the countries surveyed have plans or strategies in place and a further 53 per cent have initiated a process for the formulation of an IWRM plan. The remaining 26 per cent have made only limited progress and in many cases have expressed the wish to move forward but need support in this process (GWP, 2006). Progress in this context is based on the assessment criteria use that the assessed countries have initiated policies, laws, plans/strategies, and not the actual implementation of IWRM principles on ground. Based on the two survey results, it would seem that the IWRM concept appears to be well accepted as the way forward for better water resources management and use. It would have been interesting to know from the assessed countries what their interpretation of the concept was. What governance structure was put in place to ensure effective implementation of the processes? At what level was the planning done?

In their book *Integrated Water Resources Management in South and South East Asia*, Biswas et al. (2005) assessed the status of the implementation of the IWRM concept in eight countries (Bangladesh, China, Indonesia, India, Malaysia, Nepal, Thailand and Vietnam) from South and South East Asia to answer the following questions (among others):

- How has each country, river basin, or a smaller geographical unit, on which the case study is based, defined IWRM?
- What have been the overall results (positive, negative, or neutral) on water management due to the implementation or non-implementation of the concept?
- If the concept has worked, what were the conditions that made it work, and why? What can be done to further improve the operation and efficiency of the concept?
- Based on these experiences, what lessons can be learnt? If the concept works, how can its operation be made more efficient and widespread? If it does not, should a new paradigm or pluralism of paradigms be considered, depending upon social, economic, institutional and other relevant conditions for each specific case, and/ or region? (p. vii)

The reflexive water governance approach proposed for the current study is presented in Figure 2.5.

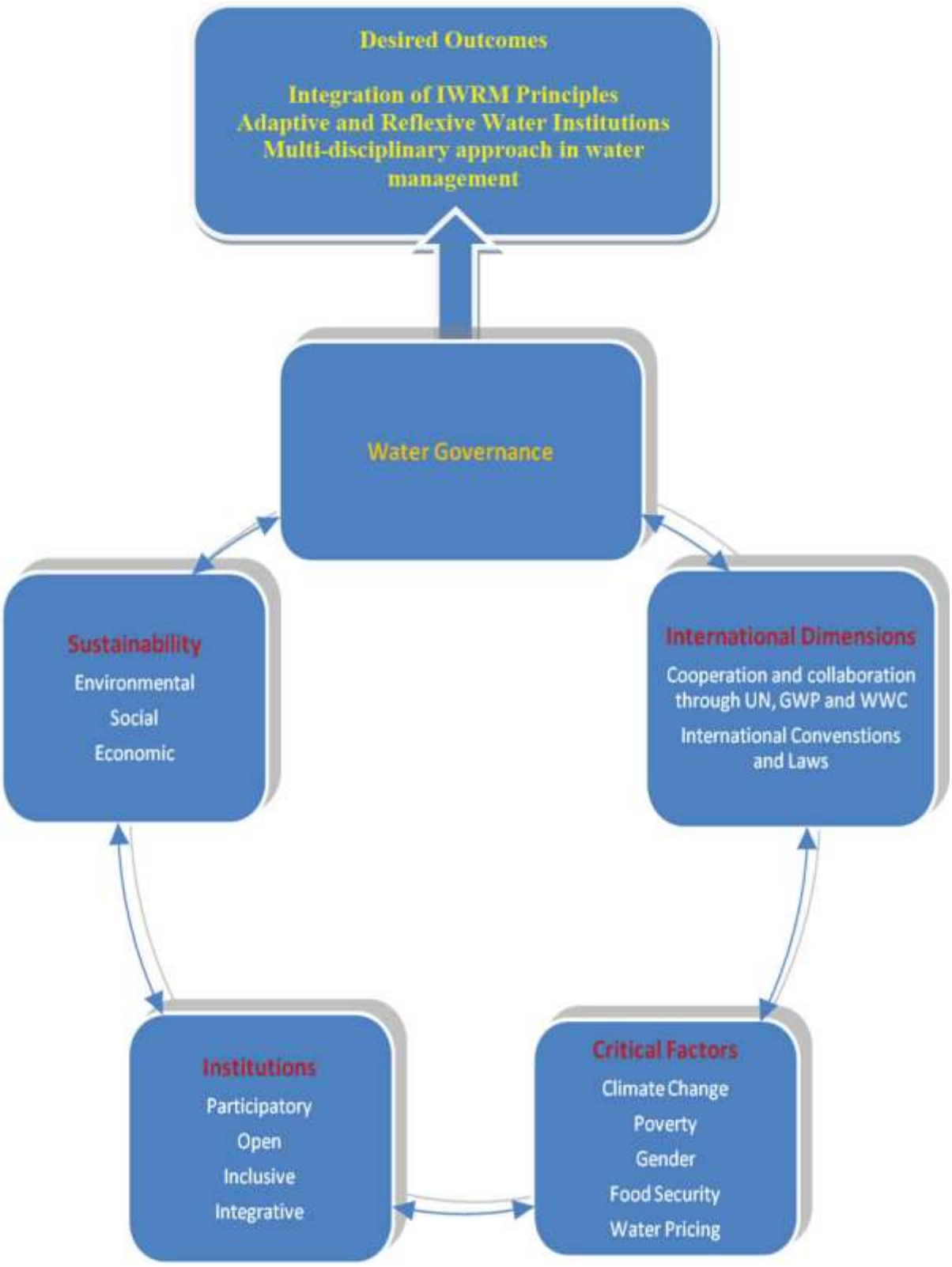

Figure 2.5: Reflexive Water Governance Approach

The approach contains four main components – sustainability, institutions, critical factors and international dimensions. As argued earlier to manage the water sector in a country, these issues should be considered (Cap-Net and UNDP, 2008; Ahmed, 2008; Rogers and Hall, 2003; Chadwick and Datta, 2001b; Ahmad, 2003; Fisher, 2009). All critical issues related to water resources fall under these four main components. For achieving IWRM, these elements are vital. The four main components are also interconnected, meaning that each factor depends on the other factors.

2.8 CONCLUSIONS

Based on the review of literature on IWRM and the international perspectives and initiatives on the subject of water management, a reflexive Water Governance Approach has been posited as having potential benefit for the improved management of water resources in line with IWRM principles. It has been argued that the reflexive governance approach which is proposed here could serve to enhance good governance in the water sector.

It will therefore be important to review, for example, the governance systems and the processes adopted in the assessed countries. In Chapter 4 water governance in the context of IWRM in India and Australia will be examined in line with the proposed approach. It will examine whether those elements as well as reflexivity in the water governance shown in the approach are also crucial for achieving IWRM principles in those countries. Lessons learned in those countries in the context of water governance might be useful for developing countries like Bangladesh to implementing IWRM principles through adaptive and reflexive water governance. Biswas and Tortajada (2010) argue that 'good water governance' cases might be useful:

> What is needed is a determined attempt to identify cases of 'good' water governance (in contrast to the 'best') from different parts of the world which can then be used to learn lessons which can be considered for possible use, after suitable adaptations and modifications, in other countries or cities. (p. 138)

The discussion that follows aims at reviewing the status of IWRM implementation with the view to identifying the apparent and observed conceptual and applied 'model' of IWRM recommended by the GWP. Given the discussion on IWRM and the mechanism to achieve it, the current study seeks to examine the approach of 'reflexive water governance' presented at Figure 2.5, to examine whether this could deliver IWRM outcomes in Bangladesh. In the following chapter, the research methodology of the current study is described to examine the proposed approach as presented.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter highlighted that implementation of IWRM is a long drawn out process. In many countries, the path to achieving it has been lengthy and difficult. Countries like Bangladesh are vulnerable due to uncertainty arising from global warming and climate change. The IWRM principles may have leverage on tackling climate change through adaptation in the water sector. In order to achieve a desired target in terms of implementation of IWRM in Bangladesh, a 'reflexive governance structure' is proposed as outlined in Chapter 2.

The purpose of this chapter is first to provide a sufficient scholarly justification of the method that was used for the research (including examination of critical considerations concerning the implementation of that methodology). Second, later in the chapter is detailed the method that was adopted, based upon both scholarly and practical considerations of the context within which the research was implemented.

The methodology used in this research study is based on a 'multi-method design' incoporating literature reviews (Chapters 2, 4 and 5) leading to a study with focus groups, semi-structured interviews and case study involving key officials, prominent water experts in the country and direct beneficiaries related to the water sector in Bangladesh (Chapter 6). The purpose of this qualitative research is to examine the proposed approach of water governance in the context of Bangladesh's water sector. This chapter presents a theoretical justification of the selected methodology.

3.2 CONSIDERATIONS IN THE SELECTION OF THE RESEARCH METHODS

The IWRM approach cannot be the panacea for resolving water management and governance issues as there are many practical difficulties in implementing the principles. However, it can facilitate efficient and effective water governance in developing nations (GWP, 2000a). It appears from policy documents of the GWP that water resource issues are complex and a holistic approach is required to understand the issues clearly (Essaw, 2008). Such an approach should also be reflexive in nature as narrated in the previous chapter.

Crotty (1998) points out that in developing a research proposal one needs to put forward answers to two critical questions: what methodologies and methods would be employed and second, why the selection of this particular methodology and method was made. Before enumerating the research methods to be used in this study, it would be useful to have definitions of relevant terms (Crotty 1998):

> *Methods:* The techniques or procedures used to gather and analyse data related to some research questions or hypothesis.

Methodology: The strategy, plan of action, process design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.

Theoretical perspectives: The philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria.

Epistemology: The theory of knowledge embedded in the theoretical perspective and thereby in the methodology. (p. 3)

Research processes require a clear understanding of the methods and methodology engaged in the study. This enables the researcher to derive the desired objectives of his or her research agenda. Definitions of the research methods will be helpful to design the research using the multi-method research approach. In the following section, the research design and argument for the multi-method approach is presented.

3.3 RATIONALE FOR A MULTI-METHOD APPROACH

Kaplan (1964) argues that 'method' in qualitative research means to collect data using different techniques, approaches and procedures. As mentioned earlier, the current study uses 'multi-method designs' defined by Tashakkori and Teddlie (2003a) as:

> Mixed methods are differentiated from multi-method designs in which the research questions are answered by utilizing two data collection procedures (e. g., participant observation and oral histories) or two research methods (e.g., ethnography and case study), both from earlier qualitative or quantitative traditions. (p. 62)

Though a multi-method approach is defined as engaging types of methods from either quantitative or qualitative traditions, the current study utilises different methods of data collection to get a clear picture of the governance of water resources in Bangladesh. These are literature review, semi-structured interviews, focus groups and a case study for Bangladesh as well as for Australia and India.

Tashakkori and Teddlie (2003b, p. 15) also suggested the combination of 'mixed methods research', which means combining quantitative and qualitative methods, as this would enable the researcher to conduct data analysis with more clarity:

> A major advantage of mixed methods research is that it enables the researcher to simultaneously answer conformity and exploratory questions, and therefore verify and generate theory in the same stud.

The current study examines the hypotheses using only qualitative techniques. A brief outline of each of those techniques is furnished below.

3.3.1 Arguments for and against the case study approach

Comparative and local case studies are used in this research. The case study approach has been subject to serious criticism but ultimately it has been proved to be useful in social research (Gerring, 2007). Patton (1990) claims that the case study approach has become

increasingly accepted in social research. In this thesis, a selected group from Bangladesh who are expert stakeholders in managing water are interviewed to test the proposed water governance approach for Bangladesh. The qualitative methods used aim to test whether a reflexive governance structure in the water sector is perceived as likely to deliver the desired outcomes of IWRM with Bangladesh as the 'case study area'. Majchrzac (1984, p. 63) argues that case studies are advantageous in many respects as they 'are usually quick, cost effective and allow room for impressionistic analysis of a situation'. As argued by Gerring (2007) and Majchrzac (1984), case studies comprise a frequently used method in policy research. They provide scope for examining the process by which a policy has been implemented and furnish guidelines for the development of recommendations for future policy options.
Denzin and Lincoln (1998) argue that a research design is a set of guidelines establishing theoretical perspectives in line with the approaches of research methods for collecting research data. The research design helps researchers to examine empirical data and use them in presenting data from specific persons, stakeholders, institutions, and bodies of relevant useful materials as well as essential documents and archives (Denzin and Lincoln, 1998). Research methodology connects theory with method in a systematic manner to 'create a guide to, and thorough, research design,' (Hesse-Biber and Leavy, 2006, p. 21) formulating a set of questions for data analysis and data presentation.

The central question of the current study is: can 'Reflexive Governance' deliver IWRM outcomes in Bangladesh? This involves considerations such as i. has the principles of IWRM been adopted or integrated in the water sector of Bangladesh? Are the current institutional arrangements of the water sector in Bangladesh a barrier to achieving IWRM outcomes? Can a Reflexive Governance framework deliver IWRM outcomes in the Bangladesh water sector? Is a multi-disciplinary approach required in managing change to achieve IWRM outcomes? The study must rigorously examine the existing water policies and issues related to the context of Bangladesh (social, economic, political and environmental aspects). The research method uses data and evidence from different sources including semi-structured interviews, focus groups, policy and documents analysis and observations.

According to Bellamy et al. (2001) natural resource management requires a thorough methodological process:

> Natural resource management initiatives need to be evaluated as a system that links the objectives and instrumental rationale of the policy or program to actual performance on the ground. Developing an improved framework and methodologies for analyzing situations, incorporating institutional concerns and, in turn, informing the process of improvement, therefore, requires a systematic and integrated approach. (p. 408)

Three groups of stakeholders: policy makers, executing agency officials and beneficiaries are interviewed. The first two groups were interviewed using a semi-structured questionnaire while the third group the beneficiaries, were interviewed as focus groups.

3.3.2 Literature Review approach

Neuman (2006) argues that it is an essential step in a research process to review previous studies to gather knowledge on the subject and build ones' argument on that basis. Shahjahan (2008) narrates that the different purposes of literature review are to:

- Demonstrate a researcher's familiarity with the area of knowledge;
- Show the links between current project and previous research;
- Integrate and summarise what is known or not known in an area, and
- Learn from others and stimulate new ideas. (p. 50)

Yin (2003) suggests that documents play a critical role in data collection for case study research. Woodside (2010) gives 12 principles for high quality case study research as follows:

- Configured, not net effects
- Unconscious, not conscious thinking
- Dynamic, not cross-sectoral design
- Multiple routes, not one model only
- Predictive validity, not only a best fitting model
- Context, not context free
- Conjunctive-disjunctive, not compensatory decision-making
- System thinking, not independent versus dependent conditions
- Multi-persons, not one person
- Satisfy, not optimise decisions
- Un-obstructive evidence, not just obstructive interviews or observations
- Visual, not just verbal data collection and interpretation. (p. 397)

The current study primarily focuses on the literature of water policy, governance and management in the context of IWRM including experiences for Australia, India and Bangladesh. The sources of the literature included peer-reviewed journals such as *Water International*, academic books and theses on water policy, law and governance.

3.3.3 Focus Group Survey approach

The focus group method is where a small number of people interact with the researcher addressing the research agenda. Usually the number in a focus group is between 4 to 12. Wilson (1997) describes the main elements of a focus group as being:

- A small group of 4-12 people;
- To meet with a trained researcher/facilitator/moderator,
- For a period of 1-2 hours;
- To discuss selected topic(s);
- In a non-threatening environment;
- To explore participants' perceptions, attitudes, feelings, ideas, and
- To encourage and *utilise group interactions*. (p. 211)

Jackson II, Drummond, and Camara (2007) argue that the focus group technique helps the researcher to conduct the study effectively within a short period of time. However, the method is also critiqued, as focus groups can be seen as artificial and potentially lacking rigour. Jackson II et al. (2007, p. 25) point out:

> ...and there is a possibility that groupthink may threaten the dependability of the data, especially in situations where actual or perceived experts and non-experts are both included.

Wilson (1997) strongly argues in favour of focus group for the following reasons:

- Encouraged more open discussion of sensitive issues—sensitive for both respondents and researchers;
- Allowed us to probe for meaning where we might have been more reluctant to do so in individual interviews;
- Demonstrated a greater variety of discourse than is available in other methods with the exception of observation; and
- Let us experience being in a group with our respondents and hearing them talking with their peers. (p. 221)

Wilson (1997, p. 221) concludes that 'focus groups provide the best illuminative data on the way respondents interact with each other outside naturally occurring events'.

3.3.4 In-depth Interviews approach

In qualitative research interviews are used 'for generating data from individuals and/or groups utilizing structured, semi-structured, or unstructured questioning formats' (Jackson et al., 2007, p. 25). Knox and Burkard (2009, p. 571) argue that:

> Interviews have become such an important tool to qualitative researchers that many qualitative methods rely heavily or solely on them as the primary mechanism for data collection.

In this study in–depth, semi-structured interviews are carried out to identify the key information required in the evaluation of the proposed approach (Hesse-Biber & Leavy, 2006).

3.4 JUSTIFICATION FOR THE QUALITATIVE RESEARCH METHOD

Gerring (2007) argues that:

> ... the notion of a case study is sometimes employed as a broad rubric covering a host of non-quantitative approaches-ethnographic, clinical, anecdotal, participant observation, process tracing, historical, textual, field research, and so forth. (p. 10)

To conduct a case study, the investigator may use either quantitative or qualitative methods or even some combination of both (Gerring, 2007). Silverman (2005) narrates that in one

research activity, the qualitative technique may assist the researcher to understand a number of issues. Silverman (2005) suggests:

> …we must not draw too sharp a distinction between quantitative and qualitative research. Qualitative research can mean many different things involving a wide range of methods and informed by conformity models. Ultimately everything depends on the research problem you are seeking to analyse. (p. 14)

There are plenty of discussions of the epistemological basis for using either of the methodological approaches – qualitative or quantitative – to a research survey (Bryman, 2001; Denzin and Lincoln, 1998; Sarantakos, 1998; Silverman, 2005). The issue further extends to the argument around what is constituted as 'methodology' and under what situation the researcher should use a specific methodology (Sarantakos, 1998). Shahjahan (2008, p. 41) presented a summary of the competing paradigms of social research, which is given in Table 3.1.

Table 3.1 Major Interpretive Paradigms Governing the Social Research

Paradigm	Features	Purpose of Inquiry
Positivism	Based on naïve realism with the belief of a real world out there to be studied, which is extended to the observer and does not change with time or location of the observer. Can be observed repeatedly by set methods and procedures.	Explanatory, ultimately enabling the prediction and control of phenomena, whether physical or human.
Post-Positivism	Recognises that researcher cannot be absolutely 'positive' about their 'knowledge claims' as causes probably determine effects or outcomes. Knowledge is based on central observation and measurement of the objective reality that exists 'out there' in the world. Involves numeric measures of observation and studying behaviour of individuals.	Same as Positivism
Critical Theory and related ideology, referred to as 'Critical Theory et al…'	Our analysis of reality is always influenced by interpretations. There is never any truth independent of interpretations. The research brings assumptions, a tradition of understanding to their research which shape how the researcher is conducted, what is done, and what is found. The researcher and the object under study are interactively linked. The transactional nature of inquiry requires a dialogue between the investigator and the subjects of the inquiry.	Critique and transformation of the social, political, cultural, economic, ethnic, and gender structures that constrain and exploit humankind, by engagement in confrontation, even conflict.
Constructivism (often combined	It is assumed that individuals seek understanding of the world in which they live and work by	Understanding and reconstruction of

with interpretivism)	constructing subjective meanings of their experiences directed toward certain objects or things. The meanings, being varied and multiple, lead the researcher to rely as much as possible on the participants' views of the situation being studied. Can be studied by conventional hermeneutic techniques, and are compared and contrasted through dialectical interchange.	construction that people initially hold, aiming toward consensus but still open to new interpretation as information and sophistication improve.

Source: Adapted from Shahjahan (2008).

Guba and Lincoln (1998) postulate that the responses to three main questions relating to ontological, epistemological and methodological inquiries allow the classification of any research activity within the four fundamental research paradigms: positivism, post-positivism, critical theory and related theories, and constructivism. The essential components of these four paradigms are presented in Figure 3.1. This figure also presents the position of the current research study in respect of ontological, epistemological and methodological questions.

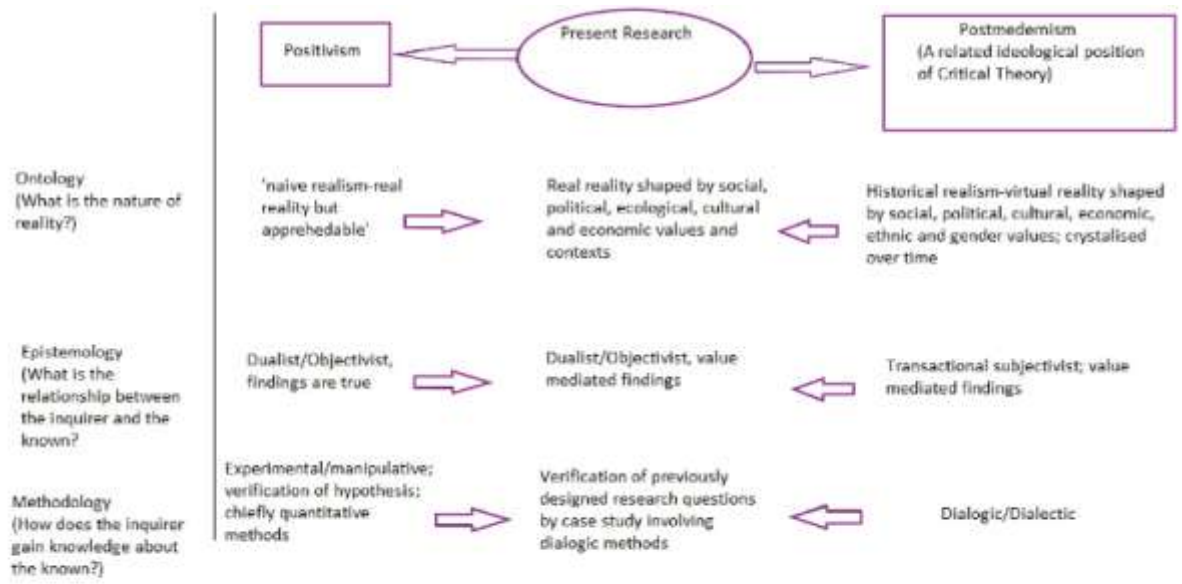

Figure 3.1 Theoretical Framework of the Present Research, Source: Adapted from Shahjahan (2008, p. 43)

Sarantakos (1998) argues that individual research is unique and every researcher follows his/her own research agenda. It is essential to demonstrate the relevance of the procedures used in the research with sufficient reliability of methods adopted and presented with valid conclusions (Sarantakos, 1998). Bryman (2001), Lincoln and Guba (2002), Marshall and Rossman (2006) and Sarantakos (1998) present many examples in regard to the criteria in refining qualitative research. Shahjahan (2008) presents a case study research approach as

developed by Yin (2003) for parallel measures to clarify whether the case study approach is valid and dependable.

Lincoln and Guba (2002) suggest the following four criteria for evaluating the merits of a case study research:

- Resonance: assess the degree of fit, overlap, or reinforcement between the case study report as narrated and the basic belief system within the specific paradigm, which the researcher has chosen to follow;
- Rhetoric: assess the form, structure, and presentational characteristics of the study;
- Empowerment: assessing the ability of the case study to evoke or generate action on the readers' part, and
- Applicability: assess the extent to which the case study facilitates the drawing of inferences by the reader that may have applicability in the reader's own context. (p. 206-212)

According to Yin (2003), data triangulation is a technique where multiple sources of data are used in a research to support the same symptom or indication. Yin (2003) also suggested that data triangulation is an effective way in a case study approach to improve the quality of the research. It is also perceived that any finding or conclusion derived based on multiple sources of data (in-depth interviews, case study, focus groups survey and literature review) is more likely to be accurate and convincing (Yin, 2003).

The current research uses the general approach of a case study in line with the narrated philosophical and methodological processes. The data triangulation approach is used with multiple sources of data, combining them into a common interpretation and explanation as described in the subsequent sections.

3.5 DATA COLLECTION TECHNIQUES

Given the objectives of this research, it was essential to use a variety of forms of intelligence in order to reach useful conclusions. That necessary intelligence includes

1. A sufficient understanding of the principles and application of IWRM in other settings, so as to obtain insights into the challenges which may be expected for its implementation in Bangladesh;
2. Comparative assessment of the institutional and other arrangements that have been applied in other jurisdictions. This intelligence is needed in order to provide insights into the institutional options that might be used in Bangladesh, and the implementation challenges that these may face.
3. In-country assessment, from both an institutional and implementation perspective. This intelligence is needed in order to understand in depth the issues that challenge effective use of IWRM in Bangladesh, so as to develop useful recommendations.

As a result multiple methods of data collection techniques have been used in this study. Shahjahan (2008) argues that a multiple data collection technique 'will fill any gaps in information and provide a clearer picture' (p.48). The data collection techniques utilised in this research includes literature reviews, case study analysis via semi-structured interviews and focus groups. A brief description of each of the techniques is presented below.

3.5.1 Literature Review

This study utilises literature reviews as one of the sources of data to test the research hypotheses. This included all relevant books; journal articles; professional publications; government publications; conference proceedings; policy papers and reports on IWRM, water governance and Bangladesh water issues. Information was also reviewed on the issues concerning the four pillars of the proposed approach – sustainability, institutions, critical factors (climate change, poverty, gender, food security and water pricing) and international dimensions.

3.5.2 In-depth Interviews

One questionnaire was prepared for each of the two groups: a) policy makers and experts, and b) direct beneficiaries. Face-to-face interviews were held with all individuals using the questionnaire, except in the case of respondents who were not able to participate in person where an email or telephone interview was carried out. The telephone interview questionnaire was the same but duration was less and the actual feedback to the questionnaire was to some extent less as opposed to the face-to-face interviews.

The study intentionally selected the interviews to ensure the inclusion of persons who are either responsible in policy formulation in the water sector, or are stakeholders. These people are the most knowledgeable in the topics of the research. The experts and policy makers were requested to furnish their views on the proposed water governance approach. The interviews were conducted by using a semi-structured and open-ended technique using the questionnaire as the guide.

Interviews with policy experts were carried out to get the following information:

- To gain an insight into the water policy formulation in the country;
- To seek the knowledge on the current institutional arrangements of the water sector, and
- To seek their views and ideas on the proposed water governance approach.

The views of stakeholders – ordinary farmers and NGO officials – were important as these people are the direct beneficiaries. They were targeted to gather the following insights:

- To gain an idea on the perspectives of IWRM in the country;
- To assess their knowledge on the issue related to water governance, and
- To get their feedback on the 'right structure' of water governance in the country, this would help to examine the proposed water governance approach.

3.5.2.1 Sampling the research respondents

A purposive sampling of focus groups was applied as Bryman (2004) suggests that in qualitative research this sampling method is useful. This sampling procedure allows flexibility in targeting relevant sources, rather than relying on statistical sampling, which is not effective for this type of policy research (Patton, 1990). The respondents include senior water policy makers; key officials of the concerned department; officials of policy

formulation and executing agencies of the water sector, and direct beneficiaries (farmers and land owners). Table 3.3 shows the composition of the respondents for the individual and focus group interview.

Table 3.3 Composition of Respondents for the Interview

Type of Persons	Type of Interview	No. of Persons	Reasons for the Selection
Senior Policy maker	Individual	01	One of the top policy makers in the water sector
Key Officials of the Ministry of Water Resources	Individual	02	These officials are responsible for institutional management of water sector in the country.
Research and Planning Organisation	Individual	02	This organisation is one of the lead agencies of the Government responsible for research and development of water issues in the country.
Water Experts	Individual	03	These experts are prominent figures in Bangladesh in water policy and management.
Field Level Officials	Focus Group-1	03	They are officials of one of the water management associations in the country who execute the decisions of the association in respect of water issues in the case study area.
Direct Beneficiaries	Focus Group-2	13	This segment of the respondents could critically evaluate the effectiveness of the water management practice in the country. They depend on the day-to-day activities as well as policy in respect of water resources in the country. .

3.5.2.2 Study locations and field observations

The respondents in the category of policy makers and experts, and the research and planning organisation for water management issues, were based in Dhaka, the capital of Bangladesh. Field level officials and beneficiaries of water sector, the other respondents, were based in Patuakhali a district headquarters of Bangladesh.

3.5.2.3 Ethical Concerns

Standard ethical procedures were maintained by providing the information sheet and consent form approved by the Ethics Committee of the University of New England, Armidale. At the beginning of the interview the issue of ethics was explained to the respondents. They were also allowed to withdraw from the interview at any time and were free to ask any questions at any time. Confidentiality and anonymity of the interviewees was ensured.

3.5.2.4 The Questionnaire and interview process

The questionnaire was earlier approved by the Principal Supervisor and the Co-supervisor of the research. Interviews of the experts based in Dhaka were undertaken from 15th June to 15th August 2010. Interviews of the field level officials in Barisal were undertaken from 7th to 15th August 2010. The Minister for Water Resources and key officials of the Ministry of Water Resources were interviewed from 1st to 15th June 2010. The questionnaire, information sheet, consent form and the proposed approach of the water governance were sent by email to the respondents based in Dhaka prior to their interviews so that they could prepare to respond to the questions. The selected persons were able to communicate in English. We attempted to locate ordinary farmers (beneficiaries) who can speak English. None were available. Therefore, the questions were asked in Bangla and responses were recorded for later translation and verification. The interview session was utilised to gather field level data from the selected project area of Bangladesh Water Development Board (BWDB) where, a National Water Project "Integrated Planning for Sustainable Water Management" (IPSWM) was carried out with the assistance of the Government of Netherlands. This project is a case study to implement IWRM in Bangladesh.

3.5.2.5 Accessing the respondents: making contact

All respondents except the respondents based in Barisal (field level) at the IPSWM Project were contacted via email and telephone for an appointment for the interviews. The researcher was previously acquainted with many of the respondents, through the civil services, or through professional interactions in Bangladesh. This facilitated access and cordial responses.

3.5.2.6 Recording the interviews

As per the requirement of the University of New England, all interviews were tape recorded. The researcher needs to keep the data in the required security for 5 years after completion of the research unless the interviewee was unwilling to have the data maintained in this form. In that case, notes were taken. Tape recordings also helped to transcribe the data, and prevented inaccuracies.

3.5.3 Focus group survey

In the case study area of Bangladesh where the IPSWM project is being implemented, two focus group interviews were conducted. The first one was with the members of the Water Management Organisation (WMO) in *polder* [a water management area] 43/2D. The second focus group meeting was with the members of one association on Water Management Groups (WMG). The focus group served to provide further verification and critical reflection on the result of the in-depth interviews.

3.6 DATA ANALYSIS AND PRESENTATION

There is a limited population of experts in Bangladesh water management and the issues within this research are complex. The field survey deals with a small number interviews,

purposively sampled to get as much information as possible on the issues of the current study and the issues related to the expertise of the interviewee (Silverman, 2005). The respondents are perceived as experts, and not just as a source of data (Sarantakos, 1998). Details of the focus groups interview opinions and suggestions are presented in chapter 6. Since the sample size is small, a manual analysis is undertaken.

Researchers use different coding methods depending on his/her research objectives. Ryan and Bernard (2000, p. 780) point out that:

> Coding is the heart and soul of whole text analysis. Coding forces the researcher to make judgments about the meanings of contiguous blocks of text.

Transcription of the digitally recorded interviews was done and the contents were analysed from July to August 2010, while the interviews were conducted. Computer software was not used as the sample size was small and the issues complex. The responses of the semi-structured interviews were manually coded with putting a number against each respondent while the two focus group interview sessions are given two other numbers. This is furnished at Annexure-III.

Some photos of the field survey are presented to give visual support to the field work. Some quotations are cited from some interviews where the 'flavour' of the comments is informative.Anonymity of the respondents is maintained by using a unique code for each respondent.

3.8 CONCLUDING REMARKS

This chapter has detailed the research method, and provided a justification for the selected approach in terms of the data required and the design of the research methods.

The next chapter will present an analysis of water policy and governance in the context of IWRM principles in two countries –Australia and India – to present how IWRM practices are being implemented with varying degrees of social, economic and political status. The experiences and lessons learned in those countries in the context of IWRM will be examined and tested against the proposed water governance approach in Chapter 2. This would facilitate the understanding of the governance structure for IWRM to be developed in countries like Bangladesh.

CHAPTER 4

WATER POLICY AND GOVERNANCE: INTERNATIONAL EXPERIENCES (AUSTRALIA & INDIA)

4.1 INTRODUCTION

It is evident from chapter 2 that the heritage, meaning and the aims of Integrated Water Resource Management (IWRM) are diverse depending on the context and uses of the terminology. This thesis in part considers whether implementation of IWRM depends on the specific context, and the on-ground reality of the communities in question. The approach builds on the definition of IWRM given by the Global Water Partnership (GWP). However, it draws on new concepts of IWRM, yielding an analytical framework based on the emerging 'triple bottom line of economic efficiency, social equity and environmental sustainability' (UNESCO, 2009b), while its application demands a constructivist epistemology (Essaw, 2008).

This chapter provides an overview of water policy and governance in the context of IWRM principles in Australia and India. A comparative examination of implementation of IWRM in alternative jurisdictions has been used to help identify what legal and institutional issues are likely to be pivotal to the implementation of this concept, and also to identify the practical issues of implementation that will have to be attended to ensure effective implementation in Bangladesh. The chapter also provides supportive material for policy makers and key stakeholders in Bangladesh to understand the ways in which the concept has been implemented elsewhere.

The two comparative instances, Australia and India, have implemented different approaches to IWRM, which can help inform the policy framework for water governance in Bangladesh. Both countries have a long tradition of water management which provide an opportunity to leverage ideas and lessons learned in the developed world (Australia) and the developing world (India).

Australia has a long history of water management, which culminated in the need to devise an elaborate water policy framework. The case of India is also crucial in the context of the South Asian region. In addition to regional proximity, Bangladesh has similar socio-economic, cultural, political and environmental settings to India.

4.2 WATER RESOURCES MANAGEMENT IN AUSTRALIA

Australia is considered to be an international leader in IWRM implementation (Hooper, 2005). The researcher conducted in-country evaluation and discussions with water policy experts over a number of months in order to develop a deep understanding of this experience. That history is discussed in some depth as it provides many relevant insights into institutional and social challenges for effective implementation of IWRM. Of course, these lessons are materially shaped by the different context of Australian water management when compared to Bangladesh, notably in terms of relative wealth. The second case study (India) provides an alternative set of insights in a country that has greater economic and cultural similarities with Bangladesh but which has not embraced IWRM to the same degree.

Musgrave (2008) presents a historical development of water resources management in Australia between European settlement and the 1960s as well as a brief outline of water policy emergence between 1960 and 1990. Musgrave (2008) narrates that water history of Australia could be traced in three distinct phases as:

> The first was an early establishment phase, following European settlement in 1788, when important attitudes were developed and were enshrined in seminal legislation. This was a phase of almost solely state activity, much of it before federation in 1901. The second was a development phase, marked by principally government-sponsored extensive dam building and irrigation development. Here, the Commonwealth was, at least initially, a relative passive (financial) partner. The third is a reform phase, characterized by significant changes in attitudes toward irrigation and growing appreciation of the limitations of past river management practices. (p. 29)

In the 1980s Australia experienced significant changes in water institutions restructuring for bringing efficiency in water allocation which led to greater dependency on market forces (Pigram, 1999). Pigram (1999) argues that Australia introduced economic instruments in the early 1990s for improving water management, such water markets, tradeable water entitlements, and rationalisation of water pricing. The Australian Industry Commission report of 1992 'examined institutional, regulatory and other arrangements which contributed to inefficient and unsustainable resource use, and to emerging environmental problems, and recommended ways to revise these arrangements' (Pigram, 1999, p. 495). A key finding was the need to manage water resources in an integrated way. The Council of Australian Governments (COAG) signed the *Water Policy Agreement* in 1994 to develop and manage the water resources in a more sustainable way. The Council formed a Working Group on Water Resources Policy and endorsed the findings of that Working Group. The Working Group targeted the following in respect of water resources management (Pigram, 1999):

- Allocation of water to the environment and the need for balance between environmental and developmental concerns;
- Adoption of an integrated catchment management approach to water resource management;
- Pricing reform, including full cost recovery, the removal of cross-subsidies, and provision for asset maintenance and refurbishment;
- Adoption of tradeable water entitlements;
- Clarification and consistency of property rights to water;
- Institutional and organisational reforms;
- Structural adjustment consequences and social impact of reform, and
- Community consultation and education programmes. (p. 495-496)

The main drivers of these reform initiatives were the Bruntland Commission Report, the World Conservation Strategy and adoption of Agenda 21 at the United Nations Conference on Environment and Development (UNCED) in 1992. The main challenge for Australia prior to this was to formulate 'the most appropriate mix of incentive-based mechanisms and regulatory approaches for the management of Australia's water resources' (Pigram1999, p. 508).

The Constitution of the Commonwealth of Australia gives primary responsibility of water resources to the states and territories. Water supply and demand scenarios vary in the different states/territories and the political agendas are also different, culminating in different priorities and reform agendas in respect of water resources (Pigram, 2006). A survey of state and territory agencies revealed that although agencies were supportive in delivering the directives of the 1994 Water Policy Agreement, nothing significant was delivered in the context of developing an efficient water policy (Pigram, 2006).

Pigram (2006) argues that with the 'unsavoury mix of water and politics in Australia' the task of addressing the critical issues related to water required a new vision and strategy. The 'Wentworth Group of Concerned Scientists' generated an initiative to tackle the water crisis in Australia. In 2002 a like-minded group of Australian environmental scientists met to explore the ways to address the challenge of the environment including water management in Australia. The agenda of their meeting was the fundamental issue of sustainability and productivity of Australia's resource base. The group was named after the venue of the meeting (Sydney's Wentworth Hotel). The meeting produced a seminal document entitled 'Blueprint for a Living Continent' (Wentworth Group of Concerned Scientists, 2002). The recommendations made by the Group include:

- Clarification of water property rights and the obligations associated with them
- Restoration of environmental flows to stressed rivers
- Payment to landholders for environmental services provided, such as clean water and healthy soils

McKay (2005) suggests institutional reforms in the water sector in Australia in legal, policy and organisational areas are required to streamline water allocation and management. She argues that Australia has basic institutional requirements such as: a water permit system; volumetric allocation; basin organisations, legal mechanisms for conflict resolution and water rights. However there are issues, which are not helpful for market-based water allocation and management to flourish. These included the diversity of interstate legal systems; interregional water quality standards, conflicts between private interests and public welfare and autonomy of newly created water companies (McKay, 2005).

In a report prepared by the Australian House of Representatives titled, 'Sustainability for survival: creating a climate for change: Inquiry into a Sustainability Charter' (Commonwealth of Australia, 2007, p. 15) it was emphasised that 'water is undoubtedly a major topic on the sustainability agenda in Australia'. During the inquiry the parliamentary committee examined the sustainability issue of water including the following issues for the proposed sustainability charter (Commonwealth of Australia, 2007):

- Drought;
- Population growth;
- Potential climate change threats;
- Waterways maintenance;
- Wastewater discharge reduction, and
- Electrical energy reduction. (p. 15)

According to the Water Services Association of Australia (2006) (Commonwealth of Australia 2007, p. 15) 'the response to these challenges primarily lies in conserving and diversifying supplies to remove, or at least reduce reliance on reservoirs through stormwater harvesting, water trading, recycling and desalination'. The parliamentary committee was informed that 'technology overcoming these water challenges exists, but government leadership and community support are required before its use can be expanded and further innovation enabled' (Commonwealth of Australia 2007, p. 15).

Sustainability for survival – creating a climate for change: report on the inquiry into a sustainability charter was tabled in the House of Representatives of Australia on 17 September 2007. This inquiry was commissioned following the Parliament's adoption of the Sustainable Cities report on 12 September 2005. The fundamental objective of the inquiry was to put forward to the Australian Government how it should pursue a sustainability charter that could be placed before the Council of Australian Governments (COAG) for adoption (Department of Sustainability, Environment, Water, Population and Communities, 2011).

The Commonwealth of Australia (2007) concludes that:

> It is advocated that the proposed Charter has the potential to ease conflict between the states and territories over water resource issues such as policy and allocation, but must address the issues of scale and locality. Moreover, it is contended that the Charter would provide an opportunity to guide the management of water resources. (p. 15)

However, that charter has not eventuated.

4.2.1 RECENT DEVELOPMENTS IN AUSTRALIA

National Water Initiative

The National Water Initiative (NWI) was promulgated by the Council of Australian Governments in June 2004 and signed by the Commonwealth Government and the governments of New South Wales, Victoria, Queensland, South Australia, the Northern Territory and the Australian Capital Territory. Tasmania signed the agreement on 3 June 2005. Western Australia signed the agreement on 10 February 2006. The National Water Initiative spells out the objectives, outcomes and actions for the ongoing Australian national water reforms agenda.

The NWI is the main pillar of water policy in Australia. The NWI manifests a common goal to reach a 'nationally compatible, market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes' (Commonwealth of Australia, 2004).

The National Water Initiative (NWI) reflects a shared responsibility by all governments of Australia to achieve sustainable and efficient water resources planning and development for economic, social and environmental benefits. The initiative is a long-term vision for water

sustainability. Each state and territory has an obligation to develop a plan to bring the NWI into effect.

The National Water Commission (NWC), which was established under the National Water Commission Act 2004, advises the Council of Australian Governments (COAG) and the Australian Government on national water issues and every two years, reports formally on the status of progress of the NWI.

It is perceived that the NWI has been 'a world's best practice blueprint for ensuring integrated, environmentally sustainable and economically efficient water management and use in response to a range of competing demands and in an environment of scarce and variable supplies' (National Water Commission, 2009).

The National Water Initiative's vision for policy directions in the field of water has been outlined for the years 2004–2014. An adaptive and discursive approach has been taken in the National Water Initiative (Hussey and Dovers, 2007). The key elements of the National Water Initiative are (Commonwealth of Australia, 2004):

- Water access entitlements and planning framework;
- Water markets and trading;
- Best practice water pricing;
- Integrated management of water for environmental and other public benefit outcomes;
- Water resource accounting;
- Urban water reform;
- Knowledge and capacity building, and
- Community partnerships and adjustment. (p. 24)

The water issue is highly political in Australia (Hussey and Dovers, 2006):

> Politics is the essential ingredient for producing workable policies, which are more publicly accountable and politically justifiable ... While some are uncomfortable with the notion that politics can enhance rational decision- making, preferring to see politics as expediency, it is integral to the process of securing defensible outcomes. We are unable to combine values, interests, and resources in ways, which are not political Australia. (p. 36)

Dryzek (1997) identified nine different environmental discourses (given in Table 4.1).Two discourses; democratic pragmatism and green radicalism appear to be the most used in the context of Australian water politics.

Table 4.1: Typology of Environmental Discourses

Environmental Discourse	Description
Sustainability/ Sustainable Development	Reinforces capitalist economy but economic growth, environmental protection, distributive justice, and long-term sustainability are seen to go together. Reassures developed societies that no tough choice will be made between economic growth and environmental protection.
Ecological Modernisation	A systems approach which takes seriously the complex pathways by which consumption, production, resource depletion, and pollution are interrelated. Emphasises the need for partnerships between governments, business, moderate environmentalists, and scientists to restructure the capitalist political economy along green lines.
Problem Solving Administrative Rationalism	Seeks to organise scientific and technical expertise into bureaucratic hierarchy in the service of the state, treated in monolithic terms. Strong emphasis on regulation. Strong conception of the nature of government as the administrative state.
Democratic Pragmatism	Stresses the importance of interactive problem-solving involving participants from within government and outside it. Like administrative rationalism, it takes the structural status quo of liberal capitalism as given, but government is seen not as the administrative state, but rather as a multiplicity of decision processes populated by citizens and driven by liberal democracy.
Economic Rationalism	Relies exclusively on the deployment of market mechanisms to achieve public ends. Opposes regulation. No role for government except to establish the basic parameters (property rights, infrastructure etc) of designed markets. There are no citizens in economic rationalism, only consumers and producers.
Survivalism	Recognises and emphasises the resources upon which human beings depend. Stresses that human demands on the carrying capacity of ecosystems threaten to explode out of control. Population seen as an aggregate entity to be managed by elites. Rich in metaphors based on 'limits to growth' theory.
The Promethean	Denies the existence of natural resources, ecosystems, and nature itself and therefore denies that there could be a limit to them. Humans are seen to dominate everything else, and together with energy, competition, technology and markets nature can be totally controlled (once it is fully understood).
Green Radicalism Green Romanticism	Considers that industrial society involves and induces warped conceptions of persons and their place in the world. Emphasises the need for new kinds of human sensibilities that are less destructive to nature. Two conceptions of nature captured in this discourse: 'inner nature' and 'outer nature'. Founded on the belief that governments, market and policies are of no consequence to the environment—the key to changing the world is through ideas.
Green Rationalism	Recognises that nature is a series of complex ecosystems whose wellbeing requires change in human behaviour. Social, political and economic structures are recognised as having important influence that cannot be reduced to the sensibilities of the individuals inhabiting them (such as in Green Romanticism). Humans are set apart from nature by virtue of their reasoning capacities, but they are not seen to dominate. A stewardship relationship between humans and nature is advocated.

Source: Adapted from Dryzek (1997).

The Australian National Water Commission in its third biennial assessment of the National Water Initiative (NWI) found significant impacts of the NWI upon water governance (National Water Commission, 2011). Some of the findings of the National Water Commission are presented below (National Water Commission, 2011):

- Water access entitlement reform has delivered significant benefits for water users and water management by creating a more secure, recognised property right to water;

- The standard, quality and extent of water planning have improved across Australia since 2004;
- While some progress has been made, NWI parties have not fulfilled their commitments to bring all significant interception of water within the planning and entitlement frameworks. This is a major weakness in current arrangements;
- Since 2004, NWI parties have developed benchmarks, guidelines and support tools and enhanced public reporting of performance information. These mechanisms are improving the way governments are managing water resources and delivering greater national consistency and transparency, and
- The water sector is facing a continuing skills challenge as a result of such factors as an ageing workforce, competing demand from other sectors of the economy and particular factors facing smaller regional providers. The development of the Water Industry Skills Strategy has been important in raising the profile of these issues and creating a plan for addressing them. Renewed support, including financial support, from governments and water businesses is necessary if the skills challenge is to be managed successfully.

The *Water Act 2007*(Cth)

The most important development in respect of water law in Australia in recent times has been the entry into the 'field of legal regulation' by the Commonwealth of Australia (Lucy, 2008). The *Water Act 2007 (*Cth) is a significant law in respect of water resources management at the national level of Australia which 'enables the Commonwealth to become involved in the management of the water resources of the Murray-Darling basin'(Fisher, 2009, p. 157). The Murray Darling Basin is Australia's most heavily extracted water system. Details are provided later in this chapter. Fisher (2009) points out that apart from the substance in the act, critical aspects of the Murray Darling Basin (MDB) are dealt with, and further highlights the legal aspects of the MDB to achieve sustainable management of water resources where the central analysis is in relation to the *Water Act 2007*(Cth) (Fisher, 2011).

Water for the Future Plan

The Australian Government has outlined its priorities in the field of water in a paper titled 'Water for the Future' in 2008. The key priority areas are (Commonwealth of Australia, 2008):

- Taking action on climate change;
- Using water wisely;
- Securing water supplies, and
- Supporting healthy rivers.

The Australian Government acknowledges that climate change potentially poses a threat to the economy by reducing the availability of water in the future (Commonwealth of Australia, 2008). Australia has committed to invest AUD$ 12.9 billion over ten years to secure the long term supply of water for all Australians under the Water for the Future Plan. The priorities to tackle the future challenges of water scarcity in Australia needed urgent water reform to cope in the face of climate change. Senator Wong in April, 2008 highlighted that to achieve a

successful reform in the water sector; the following things should be considered (Commonwealth of Australia, 2008):

- Addressing over allocation;
- Improving water markets;
- Urban water reform, and
- Skills and information.

The Australian Government acknowledged that it could not solve all the problems in the water sector.It endeavours to put in place a framework which would be helpful to achieve water reform (Commonwealth of Australia, 2008). The 'Water for Future' plan of the government intended to have the following characteristics (Commonwealth of Australia, 2008):

- Clear national objectives that are agreed by all governments;
- Investment that is backed by effective implementation of agreed reforms;
- Planning for balanced and sustainable water outcomes that is based on best available information and strong community consultation;
- Effective water markets that allow water to be used where it has the highest value;
- A sound economic basis for water pricing and investment;
- Effective and accountable management of environmental water that delivers the best possible environmental outcomes, and
- Better information about water availability and use, available to all. (p. 15)

4.3 AUSTRALIA CASE STUDY: MURRAY DARLING BASIN (MDB)

The Murray-Darling Basin (MDB) is well recognised in the international arena as an example of innovative basin management for a sustainable water future (Garrick and Bark, 2011). Pilz (2010) argues that integrated water management in the MDB in Australia is a role model for the world. It is acclaimed internationally that water reform in the MDB has set a trend for a global audience (Langford, Briscoe and Porter, 2010). Given the prominence of the MDB, it would be useful to examine the status of IWRM in the MDB and what lessons could be utilised in the context of the proposed water governance approach described in Chapter 2.

The Murray-Darling Basin is the largest and economically most important basin in Australia, covering a land area of over one million square kilometres or approximately one seventh of the total land area in Australia, and includes three quarters of all irrigated land (Burton, 1992). The MDB spreads over 5 states/territories of Australia namely NSW, Victoria, Queensland, South Australia and Australian Capital Territory (ACT). This basin is important for agriculture, water supply and industry in these states/territories. A map of the MDB is presented in Figure 4.1.

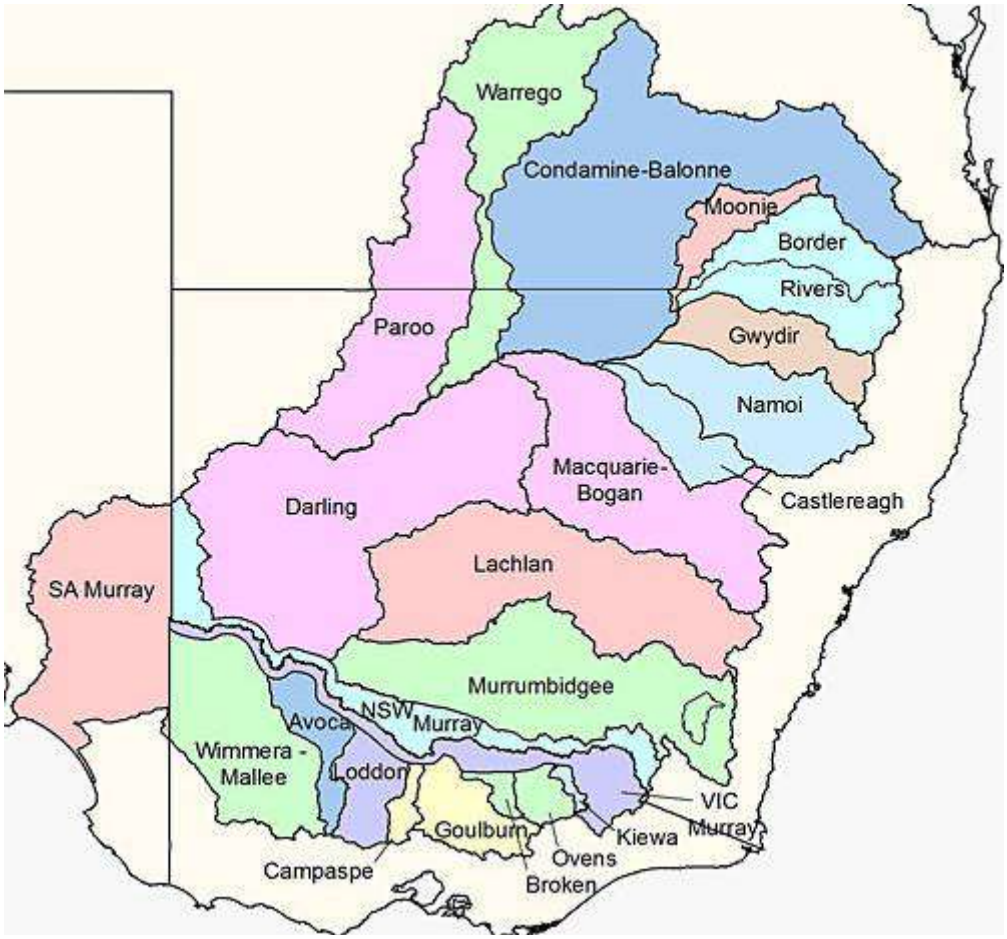

Figure 4.1 A Map of the Murray Darling Basin. [Source: Adapted from COAG Reform Council (2010)]

The distribution of MDB among these states is presented in Table 4.2.

Table 4.2 The Distribution of the Murray-Darling Basin between Australian States/Territory

State/ Territory	Total areas of States Sq km	Areas in MDB Sq km	Percent of the State/ Territories In MDB	Percent of the MDB within the state/ territory	Percent of population within the MDB	Percent Contribution to the MDB discharge
NSW	802081	599873	74.8	56.6	39.4	43
Victoria	229049	130474	60.0	12.3	28.8	46
QLD	1776620	260011	14.6	24.5	11.0	11
SA	984395	68744	7.0	6.4	5.5	Negligible
ACT	2367	2367	100	0.2	15.3	Negligible
Total	-	-	-	100.0	100.0	-

Source: Adapted from Shahjahan (2008).

The Murray Darling Basin Initiative (MDBI) of the 1980s is considered to be an initiative to achieve water sustainability in line with the global movement after the Earth Summit in 1992, which stimulated integrated water resource management (Connell, 2007). Australia considers the Murray-Darling Basin which flows through different states and territories an important place for water management reform. It is widely acknowledged that lessons from the MDB can benefit water management across the nation (National Water Commission, 2009). The MDBI was essentially a working partnership between governments and the community to implement a 1987 (revised in 1992, 1996, and 1998) inter-governmental catchment management agreement between the Commonwealth and the States of New South Wales, Victoria, South Australia, Queensland and the Australian Capital Territory. The Murray-Darling Basin Agreement and MDBI were administered by:

- The Murray-Darling Basin Ministerial Council, a decision-making forum at the State and Federal level;
- The Murray-Darling Basin Commission, an executive branch that advises the council and implements decisions, and
- The Community Advisory Committee, a forum for two-way communication between the Ministerial Council and stakeholder communities.

Resource management in the Basin was based on a Natural Resources Management Strategy (1990) and a Basin Sustainability Plan (1996), both of which were substantially revised and reported as linked initiatives (MDBC, 2003a). A reading of available policy documents reveals a focus on capacity building through development and sharing of knowledge regarding the Murray-Darling Basin as a linked biophysical and socio-economic system. However, the closely related issues of system complexity and scientific uncertainty are not mentioned. The Basin Sustainability Plan, in particular, specifies the involvement of all stakeholders in the process, but neglects institutional change as a priority (Connell, 2007).

COAG Reform Council (2010) describes the roles and responsibilities of different governments and organisations in the MDB which is presented in Table 4.3.

Table 4.3: Key players in the Murray-Darling Basin—overview of roles and responsibilities

Government/ Organisation	Roles and responsibilities
Commonwealth	Party to the Agreement on Murray-Darling Basin Reform Party to the Murray-Darling Basin Agreement, Schedule 1 to the *Water Act 2007* (Cth) Party to each of the bilateral Water Management Partnerships The Department of the Environment, Water, Heritage and the Arts administers Commonwealth water legislation, including the *Water Act 2007* (Cth)
Basin States	Parties to the Agreement on Murray-Darling Basin Reform Parties to the Murray-Darling Basin Agreement, Schedule 1 to the *Water Act 2007* (Cth) Parties to the bilateral Water Management Partnerships Following finalisation of Basin Plan, required to develop State Water Resource Plans which are consistent with the Basin Plan, in line with transitional arrangements Each Basin State's water agency manages Basin water resources in accordance with State/Territory laws and policies
Murray-Darling Basin Ministerial Council	Established under the Murray-Darling Basin Agreement, Schedule 1 of the *Water Act 2007* (Cth) Ministerial Council has an advisory role in the preparation of the Basin Plan, and a policy and decision making role for issues relating to 'critical human needs' as set out in the Water Act Ministerial Council has policy and decision-making roles in relation to implementation of the Murray-Darling Basin Agreement, including Basin State water shares and funding and delivery of natural resource management programs
COAG Reform Council	Annual report to COAG on the performance of the Commonwealth and the Basin States under Water Management Partnerships
National Water Commission	Responsible for biennial assessments of the National Water Initiative and advice to the Commonwealth on water reform Under the *Water Act 2007* (Cth), NWC has a role in auditing the effectiveness of the Basin Plan and State Water Resource Plans Assesses Basin State progress on water reform obligations under Water Management Partnerships (under a delegation from the COAG Reform Council)
Murray-Darling Basin Authority	Responsible for developing, implementing and monitoring the Basin Plan, in accordance with the Water Act Responsible for a range of other Basin functions as specified under the Murray-Darling Basin Agreement
Basin Officials Committee	Established under the Murray-Darling Basin Agreement, Schedule 1 of the *Water Act 2007* (Cth) Comprises officials from Commonwealth and Basin States The Committee is responsible for providing advice to the Murray-Darling Ministerial Council, and for implementing policy and decisions of the council, and for high level decision making in relation to river operations
Basin Community Committee	Comprises 16 members, including one from the Murray-Darling Basin Authority Main roles are engaging the community in the preparation of each draft Basin Plan, and other community matters relating to the Basin water resources Has a role in advising the Murray-Darling Basin Ministerial Council on its functions under the Murray-Darling Basin Agreement, which may include matters such as the delivery of natural resource management programs
Australian Competition and Consumer Commission	Role in developing and enforcing water charge and water market rules, along the lines agreed by governments in the National Water Initiative, and provided for in the Water Act 2007 (Cwlth) Role in providing advice to the Commonwealth Minister for Water on water charge and water market rules, as well as the monitoring and enforcement of such rules
Bureau of Meteorology	Water information functions under the Water Act, in addition to existing functions under the Meteorology Act 1955 (Cwlth)
Commonwealth Environmental Water Holder	Manages Commonwealth environmental water, in accordance with the environmental watering plan, to be developed under the Basin Plan

Source: Adapted from COAG Reform Council (2010)

Recognising the importance of the MDB, in 2008 an 'Agreement on Murray-Darling Basin Reform' was signed by the Commonwealth of Australia and the Murray Darling Basin states of NSW, Victoria, Queensland, South Australia and the ACT (COAG Reform Council,

2010). The agreement stipulates that the Commonwealth and basin states would work together in achieving the following two key tasks, among others (COAG Reform Council, 2010):

- Undertake water reforms—improve water management frameworks and services to achieve balanced and sustainable water use across the Basin by communities, industry and the environment, and

- Deliver priority projects—make infrastructure and other investments to improve the efficiency of water use in each Basin State. (p. 9)

The Commonwealth signed bilateral 'Water Management Partnerships' with each of the MDB states between November 2009 and January 2010. The agreements set out specific obligations to each of the states. Basin states were expected to fulfil targets in the water planning and management, and water markets and trading areas. The COAG Council 'identified Commonwealth reform obligations in these areas—development of the Basin Plan and establishment of the National Water Market System—which are critical to water reform in the Murray-Darling Basin and to the achievement of future Basin State milestones' (COAG Reform Council 2010, p. 10). The council assessed the obligations to be fulfilled by the Commonwealth and the Basin States and concluded that overall performance progress 'against jurisdictions' 2009 reform obligations was largely positive' (COAG Reform Council, 2010, p. 10).

The largest catchment management project in Australia is the Murray Darling Basin (MDB). In the politics of water in Australia, MDB has a significant place. In a report of the Ministerial Council on MDB, it is stated that (MDB Ministerial Council, 2001):

> We the community and governments of the Murray–Darling Basin commit ourselves to do all that needs to be done to manage and use the resources of the Basin in a way that is ecologically sustainable. (p. i)

Young (2008) presents robust ways to manage water resources in Australia by putting forward an 'institutional arrangement' which would 'fix' Australia's water allocation and investment problems. He suggests building the system on the basis of the National Water Initiatives (Commonwealth of Australia, 2004) and National Plan for Water Security (NPWS) of 2007. He claims that the problems of the Murray Darling Basin emanated from a 'flawed allocation regime' and the Water Act of 2007 would not be sufficient to tackle water allocation problems in the MDB as basin state governments could not narrow down the gaps (Young, 2008). Young (2008) argues in favour of two fundamental commitments to resolve the water allocation problems in the MDB as to:

- Replace the current entitlements and allocation regime with a robust one that can be confidently explained as one that will work- no matter what climatic future arrives, and
- Implement the resultant change in a just and fair manner. (p. 13)

Shahjahan (2008) presents a detailed description of the history of 'geo-physical, climatic, economic and environmental contexts of the Murray Darling Basin' (p.69) and its importance in respect of water management in Australia. Shahjahan (2008) argues in the context of

transferring the Murray Darling Basin approach to other countries that the approach may not be replicated or may be replicated with some adjustments of the local context as:

> ...more research and studies are required to make any conclusions about the applicability of the MDB model of integrated basin management to the developing world, particularly to the Ganges, which is complex not only geographically but also politically. (p. 97)

The *Water Act 2007* (Cth) is also designed to address the reform action relating to the Murray-Darling River Basin. Its aim is to enable the Commonwealth and the Basin States to manage the water resources in the basin for the best national interests, with benefits in the social, economic and environmental fields (Martin and Becker, 2011). In December 2008, the former Murray Darling Basin Commission (MDBC) was changed to the Murray Darling Basin Authority (MDBA) with responsibility for all of the functions of the former Murray–Darling Basin Commission (Murray Darling Basin Authority 2011). The main functions of the MDBA are (Global Water Partnership [GWP] and International Network of Basin Organisations [IBNO], 2009):

- Preparing a Basin Plan for adoption by the (national) Minister, including setting sustainable limits on water that can be taken from surface and groundwater systems across the Basin;
- Advising the Minister on the accreditation of state water resource plans (these were previously accredited by each State or Territory);
- Developing a water rights information service which facilitates water trading across the Murray–Darling Basin;
- Measuring and monitoring water resources in the Basin (previously the role of the States and Territory);
- Gathering information and undertaking research, and
- Engaging the community in the management of the Basin's resources. (p. 41)

The MDBA consists of six members with 300 staff while the Ministerial Council and the Basin Officials Committee play substantive roles in giving policy advice and other directives in respect of the functioning of the MDBA (Martin and Becker, 2011).

Box 4.1: The Governance of the Murray Darling Basin Authority (MDBA)

Governance of the Murray Darling Basin Authority

A key role for the Authority is to prepare a Basin Plan which is, for the first time, would set a long-term sustainable limit on the use of both surface and groundwater in the Murray-Darling Basin. In developing the Basin Plan, the Authority members will consult widely with Basin state and territory governments and key stakeholders, including rural communities. The Authority members will draw on a breadth of expertise and experience in water, the environment, natural resource management and agriculture. The Authority has met each month since their appointment in regional locations throughout the Basin, including a joint meeting with the Basin Community Committee.

The Murray–Darling Basin Officials Committee is established by the Murray–Darling Basin Agreement, Schedule 1 to the Water Act 2007 of Australia, as amended. The committee facilitates cooperation and coordination between the Commonwealth, the Murray–Darling Basin Authority and the Basin states in funding works and managing the Basin water and other natural resources. Membership of the committee comprises officials from the six Basin governments, and the committee is chaired by the Commonwealth committee member. The authority's Chair and Chief Executive are non-voting members of the committee. The committee is responsible for providing advice to the Ministerial Council, and for implementing policy and decisions of the council on matters such as state water shares and the funding and delivery of natural resource management programs. The committee has high-level decision-making responsibilities for river operations, including setting objectives and outcomes to be achieved by the authority in Murray River operations. The committee has an advisory role in relation to the Basin Plan, including advising the authority about engaging the Basin states in preparation of the proposed plan.

The Murray–Darling Basin Ministerial Council is established by the Murray–Darling Basin Agreement, Schedule 1 to the Water Act 2007 of Australia, as amended. Membership of the Ministerial Council comprises the Commonwealth Water Minister, who also chairs the council, and one minister from each of the Basin states and the ACT. The Ministerial Council has an advisory role in the preparation of the Basin Plan by the Murray–Darling Basin Authority. The authority will provide the proposed Basin Plan to the Ministerial Council and council may refer the proposed plan back for reappraisal if it disagrees about certain matters. The Ministerial Council will then provide its views on the proposed Basin Plan to the Commonwealth minister. When the Basin Plan is first made, the authority must advise the council on the socioeconomic implications of any reductions in the sustainable diversion limits in the Basin Plan. The authority is also required to provide advice to the Ministerial Council on the impacts of the Basin Plan five years after it first takes effect.

The Ministerial Council has policy and decision-making roles for matters such as state water shares, and the funding and delivery of natural resource management programs, as set out in the Murray–Darling Basin Agreement. The authority is required to prepare an annual corporate plan for approval by the Ministerial Council in relation to these matters. The council also has a policy and decision-making role in regard to issues relating to critical human needs as provided for in the Act, which also provides for a complementary role for the Basin Plan in this regard. The council may give directions to the Basin Officials Committee concerning its functions and powers under the Murray–Darling Basin Agreement, and can also seek the advice of the Basin Community Committee on these functions.

Source: MDBA a (2011).

(Source: Murray Darling Basin Authority 2011)

Haigh (2008) argues that:

The authority (MDBA) is likely to assume control of much that is currently controlled by local and state governments in the Basin, brought about by the need to regulate the flow and quality of water in the Murray/Darling River System. This in itself might over ride some previous rights to hold and divert water in the Basin and in some instances the hoarding of water licences and entitlements against future profit. (p. 2)

The Australian Government as well as the relevant states and territory have been partially successful in managing the Murray Darling Basin with significant water reforms in recent years (COAG Reform Council, 2010). The newly merged body of the Murray Darling Basin

Authority responsible for managing water resources in the basin has greater mandate than the previous body, under the new *Water Act 2007* (Cth). Therefore, it is expected that it will have more leverage in dealing with the water issues with the state and territory governments.

Draft Basin Plan of the MDB

The *Water Act 2007* mandated to create a Basin Plan, and the newly created Murray-Darling Basin Authority (MDBA) released a '*Guide to the proposed Basin Plan*, in October 2010 which includes six elements (MDBA, 2010).

- Determining environmental-water requirements;
- Assessing socioeconomic impacts;
- Establishing Sustainable Diversion Limits (SDLs);
- Transition to the SDLs;
- Implementing the Basin Plan, and
- Delivering outcomes. (p. 36)

The *Water Act 2007* was supported by both the Labour Party (Ruling coalition) and opposition Liberal Party as the MDB needed an efficient management for social, economic and environmental sustainability. The MDBA was mandated to consult with basin States, Basin Officials Committee and Basin Community Committee but public consultation was not mandatory (Wahlquist, 2011). The MDBA released the Guide to the Basin Plan arguably without proper consultation. At the time of release journalists and other interested parties were welcomed but the 260 pages Guide was given to them only few hours before that (Wahlquist, 2011). The release of the Guide generated a lot of criticism from the community, irrigators, journalists and academia (Wahlquist, 2011). A critical analysis of the impact on the media at the release of the Guide to the Basin Plan is presented by Wahlquist (2011). As a consequence on 7 December 2010 the then Chairman of the MDBA Mike Taylor had to resign due to difference in interpretation in respect of the *Water Act 2007* by him and the government. Wahlquist (2011, p. 126) states that '...resignation was widely interpreted by the media as not only challenging the Government's interpretation of the *Water Act,* but threatening the progress of the Plan'. This culminated in the release a Draft Plan in November 2011 for comments by public at large (MDBA, 2011).

Connell (2011) argues that in Australia for the first time a 'comprehensive approach' has been taken to tackle the governance of the MDB.He mentions:

> The new governance framework for the Murray-Darling Basin (MDB) created by the *Commonwealth Water Act 2007* is the first attempt to take a comprehensive approach to water management in the region. (p. 327)

He then critically examines the prospects of the new approach, giving a brief historical background of the governance of the MDB, particularly the role of the 'Commonwealth Environmental Water Holder (CEWH)' created under the *Water Act 2007* (Cth). In the past governance was fragmented as competing interests of the states and territory were different in the use and management of the water resources in the MDB (Connell, 2007).

Connell (2011) argues that CEWH is a 'significant' development in the direction of managing water resources in the MDB. Though Connell (2011, p. 328) expresses his doubt over the success of the proposed basin plan, he is optimistic about the success of the CEWH

as he points out, '..it will be able to achieve the environmental flow targets of the Basin Plan even if the States do not give their support'. Since 1980s Australian governments have tried many times to manage water resources in the MDB in a sustainable way, but failed (Connell, 2011). These attempts included the following:

- Salinity and Drainage Strategy of 1989;
- The Natural Resources Management Strategy of 1990;
- The Cap mechanism of the mid 1990s;
- The 1994 Council of Australian Government (COAG) rural water reform package;
- The Integrated Catchment Management (ICM) Policy Statement of 2000;
- The Living Murray First Step project of 2003-04;
- The National Water Initiative of 2004, and
- The *Water Act 2007* (Cth)

Connell (2011) argues that the prospect of water management in the future in the MDB has been shifted towards two positive 'developments', which have not been reflected in the proposed Guide to the Basin Plan of the MDBA. These are 'the creation of the CEWH and the resolution of an obscure debate about whether the environment should be supplied through so-called rules based water or through entitlements' (Connell, 2011, p. 335). Connell (2011, p. 335) hopes that in the coming days the CEWH would emerge as 'the most important water management institution' in the MDB.

Hamstead (2011) analyses the prospect of integration of the water resources management in the MDB which has been put forward by the draft Basin Plan released by the MDBA, particularly on the following issues:

- Greater integration of groundwater and surface-water management;
- Greater integration of natural-resource investment plans and water allocation plans;
- Supporting increased resilience in the irrigation industry;
- Improving the rigour of water-resource planning, and
- Governance at a regional level. (p. 340)

It is expected that through integration of the above issues the Basin Plan could make a 'big difference to its effectiveness' (Hamstead, 2011, p. 340).

Byron (2011, p. 386) criticises the Guide to the Basin Plan as not considering a participatory approach, 'this is very deterministic and authoritarian-akin to NASA planning a lunar landing'. It is argued that 'a bottom-up adaptive strategy' would more useful in managing water resources in the MDB as a 'wicked problem' (Byron, 2011, p. 386). Byron (2011) further comments that the Basin Plan needs to be reformulated if water resources management in the Basin are to be dealt with in a cost effective and equitable manner. The following four points have been put forward for the 'design and implementation of the strategy' (Byron, 2011):

- Legislatively, in the form of the Water Act 2007 and 2008, the 'strategy' is poorly designed;

- Administratively, the 'strategy' has been set up on an ill-conceived basis with an inappropriate institutional structure;
- Financially and economically, the 'strategy' could prove wasteful, and
- Underlying all of these deficiencies, the plan is fundamentally confused about causes and effects, and about means and ends. The problem is seen as a technical one to be solved by experts, rather than a social learning, adaptive process-an inclusive, long-term national conversation. (p. 387)

Byron (2011, p. 396) further argues that the whole strategy to make the MDB a sustainable one is based on a 'glib assumption' that reduction of water extractions from the Basin is 'necessary and sufficient' condition to maintain health rivers, but that is not the case, it may be necessary (even not to all areas) 'but it is certainly not sufficient'. It has been suggested in a 'smarter way' to achieve a sustainable MDB as (Byron, 2011):

> ...by working closely with the people on the ground who understand the complexities of the system and know what is feasible and necessary. This would probably include the design of ecosystem-service institutions capable of delivering environmental benefits as well as livelihood outcomes. (p. 396)

The objectives of the engagement process for *the Guide* and proposed Basin Plan are to (MDBA, 2010):

- Provide information about the Guide and the proposed Basin Plan;
- Give opportunities for people to provide feedback on the Guide, to ensure the proposed Basin Plan is based on the best available information, and
- Give opportunities for people to provide feedback on, and input to, the proposed Basin Plan, including through a formal submission process. (p. 207)

Daniell (2011, p. 419) criticises that the objectives of the Guide are simply to exchange information rather than 'interactive and collaborative forms of engagement'. Daniell (2011, p. 432) suggests the need for a 'collaborative approach' than a 'centralised technocratic approach' for the water management in the MDB in 'securing a viable and sustainable future for the basin'.

4.4 INSTITUTIONAL ARRANGEMENTS OF WATER SECTOR IN AUSTRALIA

The National Water Initiative (NWI) recognises the need for a reform in Australian water institutions for better coordination and performance (Connell, Robins, and Dovers, 2007). It envisages four derivatives to redesign the water institutions to implement the NWI for sustainable development and use of water resources in Australia being 'information needs, skills development, resourcing and regional capacities to support delivery' (Connell, 2007, p. 127 as cited in Connell et al., 2007). The National Water Initiative of 1994 has identified the following institutional arrangements responsible for bringing about reforms in the water sector.

Council of Australian Governments (COAG)

The top federal inter-governmental body in Australia presided over by the Prime Minister; COAG consists of state Premiers, territory Chief Ministers and the President of the Australian Local Government Association. Its fundamental responsibility is to formulate, devise and monitor the progress of the implementation of water policy reforms that are important at the national level and which require a collective action by the Australian federal as well as state/territory government (National Water Commission, 2012).
The National Water Commission (2012) narrates that:

> COAG is the keeper of the NWI, and oversees its implementation and effectiveness in achieving the aims of increasing the productivity and efficiency of Australia's water use, servicing rural and urban communities, and ensuring the health of river and groundwater systems.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)

The Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) implements the National Water Initiative plans of the Australian government that relate to urban water issues, high-conservation value aquatic ecosystems and environmental water accounting.

National Water Commission

The National Water Commission (NWC) is an independent statutory authority within the Australian Government Department of Sustainability, Environment, Water, Population and Communities portfolio. The Commission was established to advance the water reform agenda in Australia.

Formed under the *National Water Commission Act 2004*, the Commission provides advice to the Council of Australian Governments (COAG) and the Australian Government on national water issues.

The Commission reports directly to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities. The Commission has two main roles (National Water Commission, 2012):

- Assisting governments with the implementation of the National Water Initiative (NWI) and undertaking activities that promote the objectives of the NWI, and
- Administering the Raising National Standards Program and National Groundwater Action Plan.

The National Water Commission has seven Commissioners. The Commissioners are appointed on the basis of their expertise in water resource policies and management, relevant scientific disciplines, public sector governance and administration of natural resource programs. The Commission has a small number of support staff to carry out its responsibilities.

An overall federal institutional framework of the water sector in Australia is presented in Figure 4.2.

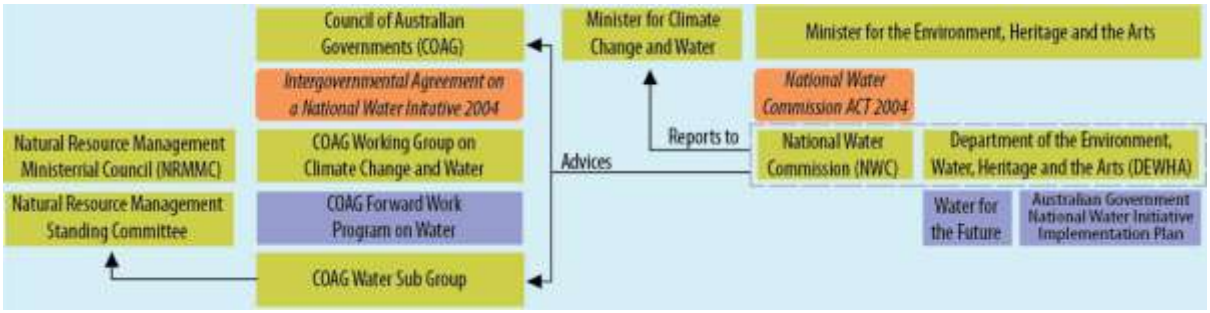

Figure 4.2. Institutional Framework of Australian water institutions.
(Source: National Water Commission 2012)

Throughout Australia, water is managed in a variety of ways. Each Australian state and territory operates under its own set of institutional arrangements. Wallis and Ison (2011, p. 4084) describe different facets of the horizontal and vertical complexity of water institutions in Australia. ACIL Tasman (2005) presents an overview of the institutional arrangements of Australian water sector highlighting the following three 'key features of institutional arrangements in Australia':

- The rights to control and use water are vested in the Crown - in particular the States, who then determine the conditions on which it is made available to others (eg licences to irrigators);
- The water supply industry is (with a few exceptions) in public ownership, and
- Various bodies administer a vast array of regulation over matters such as water resource management, water quality, pricing, and environmental impacts. (p. 1)

The above presentation briefly highlights the complex and diverse institutional arrangements of the water sector in Australia. This also manifests a real challenge for those water institutions to deliver 'effective water governance'. The following section discusses public participation in water management in Australia.

4.5 PUBLIC PARTICIPATION IN WATER MANAGEMENT

As presented earlier in Chapter 2 participation by stakeholders in decision making in respect of the planning and development of water resources is recognised as one of the fundamental water governance principles (Dublin Principles). Public participation is also given due importance by the GWP (Rogers and Hall, 2003) and highlighted in other critiques (Cooke

and Kothari, 2001). In the proposed water governance approach, participatory approaches to water management are one important element for effective institutions to manage water resources in a country.

Boully and Maywald (2011, p. 106) argue that feedback from the people in the MDB manifests that 'adaptive, inclusive, informed and fair processes' are missing. They further point out that:

> Criticism of process and at least a perceived lack of communication have been the dominant issues raised by commentators from across the MDB regarding the *Guide to the draft Basin Plan.* (p. 104)

They also describe that the National Water Initiative (NWI) of 2004 ' recognised that settling the trade- offs between competing outcomes for water systems will involve judgments informed by the best-available science, socioeconomic analysis and community input.' (Boully and Maywald, 2011, p.105). It is argued that a 'bottom-up' approach which is a participatory approach would yield a positive result in the Basin (Boully and Maywald, 2011):

> Adopting a bottom-up approach to enable communities to determine what the future might look like for them in an environment with less water would deliver better results than a top-heavy, 'one-size-fits-all' approach. (p. 107)

A Participatory approach should have the following 'key features' (Boully and Maywald 2011):

- Formal and permanent engagement arrangements focused on improving water-resource management and meeting community aspirations;
- A focus on joint discovery and mutual-gains based decision making in realistic time frames;
- Consideration of a broad range of economic, social and environmental interests;
- Processes to identify and manage conflict;
- Commitment to building the capacity of those in the community who have trouble participating due to lack of knowledge or for social or economic reasons;
- Innovation in the provision of environmental flow;
- Certainty that rights are secure and that the market will be used to adjust levels of consumptive use, and
- Establishment of multiple objectives that reflect multiple values that is measurable. (p. 108)

It has been criticised that 'The Guide to the proposed Basin Plan' has little endorsement from the community. Rather they are unhappy as they believe that they were not consulted. In the words of Boully and Maywald (2011):

> ... is the first glimpse the community has had of the work undertaken by the independent MDBA in accordance with the Water Act. Public meetings have been

> held throughout the Basin as the first step in the consultation process and irrigation communities have turned out in droves to express their opposition to the quantum of water proposed for return to the environment. It is not surprising that the initial reaction from irrigation communities is one of anger and opposition. Communities are frightened by what the future will hold for them and they lack confidence in the decision-making process. What has become evident very early is that a process to deal concurrently with the social and economic issues is missing. (p. 109)

Boully and Maywald (2011) suggests that under the existing procedures three crucial steps should be taken to 're-engage communities in designing their future in an environment where less water is available for consumptive use':

- Recommit to the concept of achieving healthy, working rivers in the MDB. The MDBA should support and resource State governments to engage their communities in water-resource planning processes. These should include designing stepped approaches to achieving the environmental outcomes articulated in the Guide to the proposed Basin Plan and taking into account the social and economic consequences of doing so. Application of local knowledge will reveal much more sophisticated and efficient means to provide water for key ecological assets and functions than can be achieved from an office in Canberra;
- The Australian and State governments should jointly fund regional communities to develop adjustment prospectuses and provide investment capital through a Future Fund, and
- The Australian Government should significantly increase investment in irrigation research and development with the goal of bringing about transformational change to both practices and production. Australian agriculture has a proud history of generating growth in productivity and innovation in environmental practice. Sustained high levels of investment in this professional and innovative sector would be a mark of respect for those who produce some of the best food and fibre in the world. (p. 109-112)

Mulligan (2011, p. 136) explains that '...the MDBA (2010, p.37) claimed that it had drawn on the 'best available biophysical and social science and knowledge' in drafting the Guide, it certainly did not draw on the best available knowledge relating to community consultation and engagement', and hence it missed an important opportunity to sell the case for water reform.' Mulligan (2011) further argues that:

> More serious consideration of the sociological literature on community and community development might have helped the MDBA avoid the mistakes it has made in putting the case for water reform to affected communities, and an investment in community development would change the dynamics in regard to community 'engagement' with water reform. (p. 135-136)

Miller (2011) presents a 'Thriving Communities Model' and argues that in formulating the MDB Plan the community at large in the Basin has been ignored:

> There is also an overwhelming sense in which the knowledge, skill experience, know-how and capacities of basin communities have not been recognised or respected and their views and perspectives have not been sought or heard. This failure to draw upon the wealth of knowledge in the Basin—to place it alongside expert scientific

> knowledge—is not simply a technical deficiency but will impede the implementation of any transitional strategy that ultimately depends on trust and collaboration between communities and government. (p. 207)

Richardson, Evans, and Harrington (2011) argue that stakeholders' participation enhances better outcomes:

> The involvement of stakeholders in the decision-making process can be made to work and will generally lead to better outcomes. Meaningful engagement with stakeholders, and the sharing of key knowledge with them, allowed joint decisions to be made by regulators, irrigators and representatives of the environment. The maxim was 'start the discussion early and start with science and the basics'. The basics include the resource values, guiding principles and a shared view of resource-management objectives. The examples of Northern Adelaide Plains and Padthaway were successful partly because the stakeholders (irrigators) who were wearing the cost of changes to water entitlements also accrued the benefits. (p. 365)

Daniell (2011, p. 414) argues that water policy should be devised with 'an inclusive and collaborative way' and examines (Daniell, 2011, p. 413) the 'opportunities and challenges' of participation of stakeholders in water management and reform process in the context of MDB. She argues that a participatory approach would bring certain benefits as:

- Adequately valuing the river-basin system along with the people managing and relying on it for their livelihoods;
- Better ensuring that the Plan is based on the best available scientific and stakeholder knowledge, and
- Allowing stakeholders to develop ownership of the Plan and prepare for changes through its implementation. (p. 431)

Therefore to bring about a 'real benefit' to the people by the MDB Plan 'the centralised technocratic approach of the MDBA with minimal levels of interactive engagement with stakeholders is inappropriate' (Daniell, p. 432). She puts forward suggestion to have enough investment for a collaborative approach for the MDB Plan reforms 'where the best available science and experience from practice on participatory processes should be drawn upon' (p. 432).

The forgoing discussion manifests that though it is apparent that 'public participation' in the water management is normal in Australia, an 'effective participatory approach' is required to reach sustainable use of water resources, including in the MDB. There are strong groups such as academia, NGOs, civil society and community groups present in Australia who can help pursue public participation in water policy and management. Achieving a 'participatory approach' in water management in Australia may be less difficult than it would be for a developing country like Bangladesh. The following section discusses the legal aspects of water resources management in Australia.

4.6 LEGAL ASPECTS OF THE WATER SECTOR IN AUSTRALIA

4.6.1 Introduction

Australia is considered to be the driest inhabited continent in the world and it has a long history of water management with necessary legal regimes (Fisher, 2000). Lucy (2008, p. 6) describes that though water laws have been in place in Australian states and territories for more than century the 'development of comprehensive, nationally coordinated systems for managing the amount of water taken from our watercourses has only begun to occur in the last 10-15 years'. COAG's Water Reform of 1994 followed by National Water Initiative of 2004 are considered to be a significant commitment by Australian governments 'to restoring over- allocated systems, expanding trade in water, and managing water more efficiently in urban environments'. (Lucy, 2008, p. 6). Lucy (2008) defines water law:

> Water law is an administrative system derived from the legislation for creating rights, obligations, liabilities and expectations in relation to the water resource, arising out of the rules of the common law. (p. 11)

The most important development in respect of water law in Australia in recent time has been the entry into the 'field of legal regulation' by the Commonwealth of Australia as Lucy (2008) argues:

> Under the *Constitution* the power to legislate with respect to water rests with the States. While the Commonwealth has been a party to agreements about the management of the Murray-Darling Basin since 1915, the *Water Act 2007 (*Cth) was the Commonwealth's first attempt to regulate water on the basis of its legislative powers. It relied on the trade and commerce, corporations and external affairs powers, among others, and the referral of powers by Basin States other than Victoria of their powers under the *Constitution.* After Victoria agreed to refer its powers to the Commonwealth in July 2008, the Basin States entered into the *Intergovernmental Agreement on Murray-Darling Basin Reform,* which promises reforms to the *Water Act 2007* which will strengthen Commonwealth control of the Murray-Darling Basin. (p. 6)

Fisher (2000) argues that in recent time Australian water resources management laws are influenced by the following 'principles':

- Sustainability of water resources;
- Integration of water resource management with land resource management;
- Formulation of goals and strategies at government level, and
- Implementation of goals and strategies at regional and local levels. (p. 7)

The structure of contemporary Australian water law is not a 'coherent and cohesive' legal system but it reflects a legal regime, which consists of the following elements (Fisher, 2000):

- The international rights and obligations of Australia as a member of the international community;
- The distribution of legislative and executive capacity among the Commonwealth, the

States and Territories in relation to water resource management as a consequence of the federal structure created by the *Constitution* of the Commonwealth;
- The residual, but by no means negligible, influence of the common law;
- The existence of native title rights and interests in relation to water;
- The creation by legislation in each of the jurisdictions of a right of primary access to water conferred upon an instrumentality of Government;
- The creation of institutional and management structures for the exercise of the right of primary access to water which is in accordance with perceived priorities and values intrinsic to water, and is also reflective of economic, social and cultural priorities and values;
- The acknowledgement or creation of rights of access to water to enable instrumentalities in the public or private sector to discharge their responsibilities in the water industry;
- The acknowledgement or creation of rights of access to water for the benefit of individual members of the public;
- The acknowledgement or creation of rights of access to the delivery of water services for the benefit of individual members of the public, and
- The acknowledgement or creation of rights and liabilities arising between and among all the participants in the system and the beneficiaries of the system. (p. 9)

4.6.2 National Water Act 2007

The preamble of the Water Act 2007 says that it is 'An Act to make provision for the management of the water resources of the Murray-Darling Basin, and to make provision for other matters of national interest in relation to water and water information, and for related purposes. The *Water Act 2007 (*Cth) is a significant law in respect of water resources management at the national level of Australia which 'enables the Commonwealth to become involved in the management of the water resources of the Murray-Darling basin' (Fisher, 2009, p. 157). Fisher (2009) further explains:

> The Act however does not give the Commonwealth total, complete and comprehensive control of the water resources of the basin. It creates a planning regime according to which rights in relation to water granted in accordance with the laws of the state or territory are to be exercised. (p. 157)

Fisher (2009, p. 157) also further points out that apart from the substance in the act, the following 'three critical aspects' are worth mentioning:

- The function of the Murray-Darling Basin Plan;
- The function of water resource plans for particular water resource plan areas, and
- Trading in water rights.

The following fundamental four objects of the Act are crucial for the MDB (Fisher, 2011):

- To give effect to relevant international agreements and in so doing promote the use and management of the Basin's water resources in a way that optimises economic, social and environmental outcomes;

- To ensure the return to environmentally sustainable levels of extraction for water resources that are over-allocated or overused;
- To protect, restore and provide for the ecological values and ecosystem services of the basin, and
- Subject to earlier two objects (second and third), to maximise the net economic returns to the Australian community from the use and management of the Basin's water resources. (p.219)

Gardner, Bartlett and Gray (2009) describe the roles of the 'new institutions' created under the *Water Act 2007* as being Murray-Darling Basin Authority, the Commonwealth Environmental Water Holder as well as specific roles to be delivered by the Australian Competition and Consumer Commission, Bureau of Meteorology and other States and Territory involved in the MDB.

Fisher (2011) concludes that the 'achievement of the objects of the Water Act 2007' would be measured by how the Act is being implemented to achieve a sustainable water management regime in the MDB:

> ...how this complicated and interrelated set of normative arrangements is realised, interpreted, implemented and enforced by those who formulate and implement the plans, exercise the rights conferred on them and discharge the duties imposed upon on them. (p. 231)

The above discussion shows that laws and regulations in respect of water management in Australia have a rich heritage. Australia has a complex legal process and until recently water has been vested on the states and territories of Australia with occasional interference from the Commonwealth. However, due to the rise of environmental, social and economic concerns of water resources, particularly in the MDB, the Commonwealth has intervened through enacting laws to achieve the coordination considered to be necessary to deliver a sustainable future for the water resources of the country. This robust legal framework in Australia facilitates in achieving effective water governance which ultimately helps to implement IMRM principles.

4.7 LESSONS LEARNED FROM THE AUSTRALIAN EXPERIENCE

The discussion on the literature of Australia on water resource issues and environmental management suggests that it has achieved a significant level of development in managing water resources. However, there has been considerable criticism over the performance in this regard (Pigram, 2006; Byron, 2011). In Australia the public sector is responsible for administration of water resources development and management, with primary responsibility resting with the individual states (Essaw, 2008). The Federal Government's direct responsibility for water relates primarily to the territories and the marine zone, as well as to research and meteorological activities (Pigram, 2006). The primacy of the Commonwealth of Australia on the issue of overall development and management of the water sector continues to be a debatable issue (Essaw, 2008; Connell, 2011). IWRM is still an evolving concept in Australia and for that matter in most of its states (Daniell, 2011). Integrated Catchment Management has been a term used in Australia for almost similar principles to that of IWRM

(Pigram, 2006). McKay (2005) argues that despite limitations on the progress in water management, the experiences of Australia give a good insight into both theoretical and practical water institutions reforms.

The Murray-Darling River Basin management is a critical example from which outside world can learn lessons in water management (Pilz, 2010). Shahjahan (2008) highlights the following lessons in the context of MDB governance:

- A long history of changes and modification in policy, legislation and strategy in overcoming the pitfalls;
- A real life experience of struggling with a mix problems of resource degradation, political tensions, wide ranging social and community aspirations regarding water quality and quantity issues;
- Adjusting, through a coordinated mechanism, the water share in quantity, quality and environmental distribution;
- An appropriate scientific method of collecting and sharing data, inevitably leading to policy and program review, and
- High level of community participation in the management process. (p. 96)

Though there are disputes over the 'effective governance' of the Murray-Darling Basin (as outlined in Byron, 2011), the Australian Government has created a collaborative framework to deal with the issue (COAG Reform Council, 2010; MDBA, 2011, National Water Commission, 2011).

Though there has been serious politics surrounding integrated water management, water management has achieved a different model of integration in Australia (Pigram, 2006). Shahjahan (2008) argues the model of MDB of Australia may not be replicated. Bangladesh could learn from the lessons of integration of water management to better implement IWRM from Australian experiences.

Given the Australian long history of water management with multi-stakeholder and multi-jurisdictional approaches as well as the integrated catchment approach in line with some of the principles of IWRM, water policy and governance aspects with some necessary adjustment could be useful for Bangladesh (Shahjahan, 2008). Considering agencies dealing with water in Australia, their institutional configuration could help in structuring (or re-structuring) Bangladesh water agencies. Water agencies in Australia adopt an 'adaptive management style' (Byron, 2011), which is perceived to be a reflexive approach to deal with the water resources.

Climate change is increasingly an emerging threat for Australia in addressing water sustainability for future needs (Commonwealth Scientific and Industrial Research Organisation [CSIRO], 2011). Australian governments have taken many measures to ensure the sustainability of water whilst addressing critical issues such as climate change, improving food security and formulating a right mix of water pricing for water markets. Specific programmes have been initiated using latest technology such as rain-water harvesting, watershed development and water conservation, in consultation with key stakeholders (National Water Commission, 2011).

It would be useful to use the lessons learned from Australian experiences in case of water management approach in Bangladesh. The level of engagement and requirement of water governance aspects of Bangladesh and Australia are different. Despite that water policy and governance used in Australia could play a direction to formulate effective water governance approach in developing countries like Bangladesh.

4.8 INDIAN WATER SECTOR USE OF IWRM PRINCIPLES

To devise a reflexive governance structure for Bangladesh, the experiences of implementation of IWRM in India are important as the social, economic and cultural history of both countries have similarities. The background, which led to adoption of IWRM by India with a brief history of policy development, is presented. A brief description on lessons learned from the Indian experiences will be outlined. A synthesis of Indian experiences in IWRM implementation is used to help devise a reflexive structure for the water governance of Bangladesh.

Unlike for the Australian case study, this investigation of IWRM in India was limited to desk-top evaluation.

4.8.1 BRIEF HISTORY OF WATER RESOURCES MANAGEMENT IN INDIA

Cullet and Gupta (2009) present a historical perspective of water resources management in India in the context of water law development in the country. They have cited the age-old water management approach from 350 BCE to 150 CE. The famous book written by Kutilya, *The Arthashastra* (The Science of Politics) provides a descriptive narrative of 'water governance' in India in respect of the 'use of water for the development of water works, irrigation, and transport, specifying that all water belonged to the king and that users were to pay a water tax to withdraw water from irrigation systems installed by the king' (Kautilya, c.300BCE, 73-74, cited in Cullet and Gupta, 2009, p.4).

India is a federal democratic republic, which recognises 'water as everybody's businesses in its Constitution (Saravanan, 2008). All surface water is public property under the law of India. With compartmentalised management—the national government is responsible for regulation and development of inter-state water issues, while the individual state is responsible for managing its surface water except for inter-state water (Saravanan, 2008).

Water resources development in India as attributed by Gandhi and Namboodiri (2009) was mostly delivered by local Kings and Nobles in early days. This approach was continued by British rulers in India. After independence in 1947 large scale irrigation emerged as a key contributor to agricultural development. This suffered a setback in 1970s due to management crises, difficulty in utilization and delivery of water at farm level (Gandhi and Namboodiri, 2009). Gandhi and Namboodiri (2009) argue that water resource management faces a crisis in India, with the crisis not about physical or technical issues but about water institutional reforms. They argue that water management is a vital issue for India 'due to rainfall limitations, growing demand, and the large dependence on agriculture for livelihoods'.

Iyer (2008) narrates a litany of water concerns of India where issues such as divergence of interests in big water projects; the Narmada and Tehri movements; flood and drought; inter-

state water disputes; water crises; water markets, privatisation and water pricing in India. Following the international campaign of implementation of IWRM, the Government of India adopted its Water Policy in 1987, and in 2002, recognised the basic principles of IWRM. At the same time, critics point out that such policies are devoid of coherence and long-term vision for the nation (Saravanan, 2008).

Sen (2008, p. 247-248) describes landmarks in the evolution of watershed programmes in India from 1956 to 2003 through various interventions of the Government of India (See Table 4.5).

4.10 INSTITUTIONAL ARRANGEMENTS

The amended (first National Water Policy was adopted in 1987) National Water Policy 2002 of India recognises the need for a 'multi-sectoral, multi-disciplinary and participatory approach' to water institutions. The planned 'Institutional Mechanism' in the Water Policy outlined below (Government of India [GOI], 2002, p. 3).

To give effect to the planning, development and management of water resources on a hydrological unit basis, along with a multi-sectoral, multi-disciplinary and participatory approach integrating quality, quantity and environmental aspects, the existing institutions at various levels under the water resources sector have to be appropriately reoriented / reorganised and even created. As maintenance of water resource schemes are not controlled by established long term plans and budgets, it is generally being neglected.

Appropriate river basin organisations are to be established for the planned development and management of a river basin as a whole, or sub-basins, where necessary. Special multi-disciplinary units are to be set up to prepare comprehensive plans taking into account the needs of irrigation but also harmonising other water uses, so that the available water resources are put to optimum use . The scope and powers of the river basin organisations shall be decided by the basin states themselves. Implementation of plan has had a chequered history, falling well short of the stated intentions.

Table 4.5 Benchmarks in the evolution of watershed programmes in India

Period and Phase	*Intervention*	*Nature of Intervention*	*Objectives/Activities*	*Approach*
1956, I	CSWSRTI Established in Dheradun	Experimental-research oriented	Understanding processes of soil degradation and options for soil conservation	Implicitly ridge-valley but sectoral approach
1959, I	CAZRI established in Jodhpur	Experimental-research oriented	Entrusted with entire responsibility for research on arid zones	Area approach as opposed to ridge to valley approach
1961-62, I	River valley projects	Implemented at a relatively small scale-expanded later	Soil conservation in the catchment of major rivers	Catchment-based with sectoral approach
1970-71, II	Rural works programmes	Implemented at a relatively small scale	To create assets designed to reduce the severity of droughts in affected areas	Area based and operated as relief measure (sectoral approach)
1972-73, II	DPAP	Implementation started at a small scale	Mitigation of drought in semi arid rainfed tropics	Administrative boundaries taken as functional unit-started in form of relief work
1978-79, II	DDP	Implementation started at a small scale	Management of drought in marginal arid/desert areas	Administrative boundaries taken as functional unit-stated in form of relief work
1983, III	CSWCRTI & CRIDA	Experimental-with spatial expansion	Development of soil water technology addressing degradation, conservation and enhancement of the two resources	Ridge to valley principles-participatory approach tried out
1986-87, III	Ministry of Agriculture started NWDPRA	Implemented with 99 watersheds in rainfed areas	Optimising production in rainfed area through natural resource management	Watershed was the operating unit with integrated approach
1989-90, III	Integrated wasteland development programme launched by Ministry of Rural Development	Implementation-transferred to department of land resources/national wasteland development board in 1992	Reduction and reclamation of wasteland through soil and moisture conservation	Administrative boundary as operating unit-sectoral approach
1990, III 1ST generation watershed projects	Ministry of Agriculture scaled up NWDPRA	Implementation expanded to 2554 watersheds aim to cover one watershed in each block	Income enhancement in rainfed area through natural resource management	Watershed as the operating unit with integrated approach
1994, III	Guidelines for Watershed Development Programme	Common guidelines for DPAP and DDP benchmark effort	Tying natural resource management to livelihoods through peoples' participation: first serious effort of convergence of programmes	
2001, III 2nd generation watershed projects	New guidelines for NWDPRA	Change in approach	Made NWDPRA more participatory, sustainable and equitable	Participatory approach institutionalised
2003, III 2nd generation watershed project	*Hariyali* guidelines	Change in institutional intervention	Two major deviations from the former guidelines- direct involvement of panchayats and provisions for treating forest land	Democratisation process-implicitly discourages NGO involvement; some coordination attempted across ministries

Source: Adapted from Sen (2008)

Bandyopadhyay (2006b) critically analyses the merits and pitfalls of the National Water Policy of India, adopted in April 2002 after revising the Policy adopted in 1987. The new National Water Policy of India has become controversial for the following reasons (Bandyopadhyay, 2006b):

- NGOs have sought a review of the Policy as disagreement on the Action Plan on Water sector has been growing and NGOs are one of the stakeholders of the issue. Experts in the water field also supported the cause of NGOs;

- Questions over scientific aspects of the inter-linking river project in India. There was no open assessment of the technical and economic feasibility of the projects, which is opposite to the principles of IWRM, and
- The National Commission on Integrated Water Resources Development Plan (NCIWRDP) maintains that crucial hydrological data of the basins are kept secret.This hinders to develop a well informed scientific knowledge on the water availability. It helps to maintain the existing practice of the old paradigm.

Based on fundamental principles of IWRM, Bandyopadhyay (2006b) examined the National Water Policy of India and recommends:

- Water systems should be viewed as integral parts of the hydrological cycle not as a stock

> ...it appears that though the new policy document does definitely try to provide itself with a more advanced and ecologically informed posture, it is still not in a position to unresistingly introduce in practice a fundamentally new way of looking at water systems. (P. 155)

- There should be demand side management of water;
- Water management should be transparent and participatory;
- The ecological view point should be considered to deal with water issue as droughts and floods are frequent;
- Restructuring the institutional framework of water systems is needed to make them equitable, sustainable and participatory;
- Recycling and reuse of water should be considered, and
- New approach to water pricing should be considered on the basis of social and economic conditions.

Bandyopadhyay (2006b, p. 168) examines the new policy on two counts: whether it is a 'new' policy or old wine in a new bottle and whether it incorporates the new ideas of water management in line with IWRM. He concludes that 'there is little indication of the much needed emergence of a new holistic paradigm of water systems management in India'. He further concludes that (Bandyopadhyay, 2006b):

> The position of confidentiality taken by the official water resource management administration in India regarding open provision of hydrological and scientific information on projects, and the near absence of open professional debates with the community of independent water professionals, has clearly protected the old and outgoing paradigm to retain its position in official policy and obstruct the emergence of integrated management. (p. 168)

The Indian Constitution gives the mandate that the water resources of the country shall be controlled between the Centre (central government) and States (Madhav, 2010). The Centre has the authority to prepare necessary legislation in respect of development, use and regulation for inter-state rivers and tributaries (Madhav, 2010). The States formulate legislation in respect of 'water supplies, irrigation and canals, drainage and embankments, water shortage, and water power' (Madhav, 2010, p. 113). The canal irrigation is 'developed and managed by public agencies, and groundwater irrigation is developed and managed by

millions of independent farmers and a growing market of informal water traders' in India (Madhav, 2010, p. 113). An important feature of the water institutions in India is that they are fragmented among different public agencies for the management of water resources (Mdhav, 2010). A brief overview of the institutional arrangements responsible for bringing about reforms in the water sector in India is presented below.

National Water Resources Council (NWRC) and National Water Board

The National Water Resources Council was set up by the Government of India in March 1983. The Prime Minister is the Chairman, the Union Minister of Water Resources is the Vice-Chairman, and the Minister of State for Water Resources, concerned Union Ministers/ Ministers of State, Chief Ministers of all States & Lieutenant Governors/ Administrators of the Union Territories are the Members. The Secretary, Ministry of Water Resources is the Secretary of the Council.

The Government of India constituted a National Water Board in September, 1990 under the Chairmanship of the Secretary, Ministry of Water Resources to review the progress achieved in implementation of the National Water Policy and to report progress to the National Water Resources Council from time to time. The Secretaries of Union Ministries of Agriculture, Rural Development, Urban Development, Surface Transport, Environment & Forests, Planning and Science & Technology, Chairman, Central Water Commission, Chief Secretaries of all States/Union Territories are its Members and the Member (Water Planning & Projects), Central Water Commission is the Member Secretary.

The National Water Resources Council (NWRC) is the highest national body relating to water sector. The National Water Board is considered as the executive body of the NWRC.

Union Ministry of Water Resources

The Union Ministry of Water Resources (MoWR) is the executive agency responsible for all aspects of the water sector in India. Under this Ministry 16 agencies are involved in planning, development and management of the water resources in the country. Among those 16 agencies the following two are prominent.

Central Water Commission (CWC)

The Central Water Commission (CWC) is the premier technical organisation in the country in the field of water resources since 1945. The Commission is entrusted with the responsibilities of initiating, coordinating and furthering, schemes for control, conservation and utilisation of water resources in consultation with the state governments concerned with flood control, irrigation, drinking water supply and hydro power development. The CWC also undertakes investigation, construction and execution of any such schemes as required.

The CWC is headed by a Chairman, who also holds the status of Ex-officio Secretary to the Government of India. It has three technical wings, namely,

- Design and Research;
- Water Planning and Projects, and

- River Management.

Each of the wings is headed by an engineering officer designated as Member, with the Ex-officio status of an Additional Secretary to the Government of India. The wings consist of organisations headed by Chief Engineers, with Directorates under them, each headed by a Director/S.E. There are 32 organisations and 147 Directorates/Circles under the CWC.

There are thirteen regional organisations of CWC spanning Bangaluru, Bhopal, Bhubaneswar, Chandigarh, Coimbatore, Delhi, Hyderabad, Lucknow, Nagpur, Patna, Shillong, Silliguri and Gandhi Nagar, each headed by a Chief Engineer. These organisations closely interact with the states. They are entrusted with the monitoring of medium and major projects, command area development, rehabilitation and renovation of water bodies, minor irrigation and other water management activities, appraisal of medium projects, flood forecasting and hydrological observations.

The functions of the CWC are as follows:

- To undertake investigations, to prepare schemes for the development of river valleys for hydro power generation, irrigation, flood management, environmental management, rehabilitation and resettlement, soil conservation, anti-water logging measures, reclamation of alkaline and saline soils, drainage and for drinking water supply;
- To assist the State Governments in the investigation, surveys and preparation of river valley and hydro-power development schemes;
- To undertake construction of any river valley development scheme on behalf of the Government of India or State Government concerned;
- To collect, co-ordinate the collection of, publish and analyse the data relating to rainfall, runoff and temperature, silting of reservoirs, behaviour of hydraulic structures, environmental aspects etc.
- To collect, maintain and publish statistical data relating to water resources and to act as the Central Bureau of Information relating to water resources;
- To initiate morphological studies to visualise river behaviour, bank erosion/coastal erosion problems;
- To advise the Government of India and the concerned State Governments on the basin-wise development of water resources;
- To advise the Government of India with regard to all matters relating to the Inter-State water disputes, and
- To initiate studies on socio-agro-economic and ecological aspects of irrigation projects for the sustained development of irrigation (GOI, 2012).

National Water Development Agency (NWDA)

The National Water Development Agency (NWDA), a Registered Society under the Ministry of Irrigation (now the Ministry of Water Resources) was set up in 1982 to carry out detailed investigations of the Peninsular Component of National Perspective for Water Resources Development. The Government subsequently modified the functions of NWDA to include the Himalayan Component of the National Perspective for Water Resources Development on 11th March, 1994 and composition of Society and Governing Body on 13th February 2003

and 12th March, 2004. In 2006, it was decided that the NWDA should explore the feasibility of linking sub-basins of rivers in States like Bihar. It was decided that the NWDA would also take up work for the preparation of the Detailed Project Report (DPR) of the Ken-Betwa link, one of the priority links under the Peninsular Component of the National Perspective Plan. To enable the National Water Development Agency to undertake these activities, its functions were further modified on the 30th November 2006 to:

- Carry out detailed surveys and investigations of possible reservoir sites and inter-connecting links to establish feasibility of the proposal of the Peninsular Rivers Development and Himalayan Rivers Development Components of forming part of the National Perspective for Water Resources Development prepared by the then Ministry of Irrigation (now Ministry of Water Resources) and Central Water Commission;
- Carry out detailed surveys about the quantum of water in various Peninsular River systems and Himalayan River systems which can be transferred to other basins/States after meeting the reasonable needs of the basin/States in the foreseeable future;
- Prepare feasibility report on the various components of the scheme relating to the Peninsular Rivers development and Himalayan Rivers development;
- Prepare a detailed project report of river link proposals under the National Perspective Plan for Water Resources Development after concurrence of the concerned States;
- Prepare pre – feasibility / feasibility reports for the intra – state links as may be proposed by the States, and
- Do all such other things the Society may consider necessary incidental, supplementary or conducive to the attainment of above objectives (GOI, 2012).

Two other important central water organisations are the Command Area Authority and the Central Groundwater Board. Decentralisation of water governance was initiated in 1992 through Constitutional amendments giving powers to *Panchayats* (rural administrative authority) and municipalities. It transpires that there are a significant number of public and private actors managing water resources in India.

Water Mission of India

The Government of India adopted the National Action Plan on Climate Change (NAPCC) in June 2008. The NAPCC outlined the principles and identified the approach to be adopted to meet the challenges posed by climate change, through eight National Missions being: the National Solar Mission; the National Mission for Enhanced Energy Efficiency; the National Mission on Sustainable Habitat; the National Water Mission; the National Mission for Sustaining the Himalayan Eco-system; the National Mission for a Green India, the National Mission for Sustainable Agriculture and the National Mission on Strategic Knowledge for Climate Change (GOI, 2008a).

The comprehensive mission document of the 'National Water Mission' identifies the strategies and methodologies in respect of the Assessment of Impact of Climate Change; the Changes in Policy, Practices and Institutional Framework; the Measures for Mitigation, as well as the Measures for Adaptations. Appropriate monitoring and evaluation mechanisms have also been proposed in the document.

Water resources schemes and projects are multidisciplinary in nature. They are implemented by several departments and agencies of State Governments and various ministries/departments of the Central Government. Therefore, it has been considered necessary to examine issues through a consultative process. Accordingly, the Ministry of Water Resources (MoWR) constituted six Sub-Committees to examine all related aspects in the field of:

- Policy and institutional Framework;
- Surface Water Management;
- Ground Water Management;
- Domestic and Industrial Water Management;
- Efficient Use of Water for Various Purposes, and
- Basin Level Planning and Management. (GOI, 2008a)

The strategies in respect of the reliable assessment of impact of climate change; the need for changes in policy and practices; the measures for mitigation, and measures for adaptation are summarised in the following paragraphs.

Bandyopadhyay (2006a) argues that the government's position on water management is not supportive of the change of style of water management from 'business as usual' to a new approach for efficient and sustainable water management, whereas the independent professionals are pro-active in support of fundamental change to the water management approach in India. He explained that water is seen as a stock of resource and the current approach of water management in India is seen in that context. It is largely guided by reductionist engineering solutions to the issue. The 'water resource technocracy' believes that the problem of a water crisis could be resolved through adjustments and modifications in managing the resources. The Institutional framework of the water sector of India is illustrated in Figure 4.3**.**

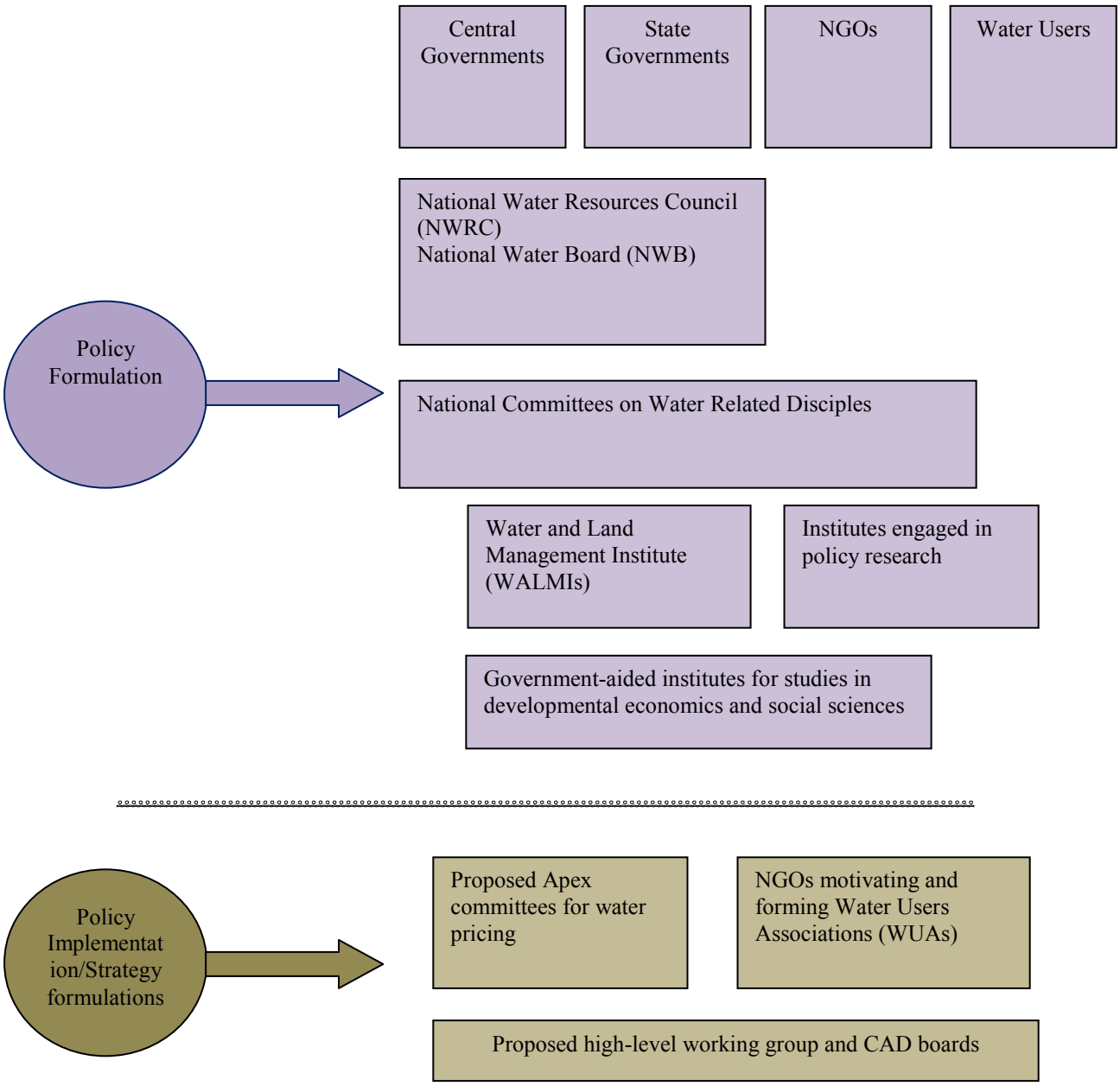

Figure 4.4: Institutional Arrangements of water sector in India (Adapted from Mohile, 1996).

Institutional structures for water resource management in India are fragmented (Saravanan, 2008) with a number of key organisations dealing with water at the federal and state levels. D'Souza (2008) argues that India's new water policy must be built on the following principles:

- Reviving natural drainage by removing the massive number of obstructions and obstacles which have and continue to strangle wetlands, lakes and streams;

- River restoration which involves not only cleaning up the high levels of pollution within our river but also recovering aquatic ecosystems through restoration of natural processes, and
- Achieving hydraulic integrity through sustained efforts to ensure the ecological connectivity of floodplain, channel, wetland and estuary. (p. 116)

Sen (2008) argues that though theoretically the watershed management approach in India reflects an integrated concept, in practice it is implemented by three different ministries of the Government of India (Ministry of Agriculture, Ministry of Rural Development and Ministry of Environment and Forest). Their respective sectoral programmes, focusing on their own operations result in a fragmented approach. Sen (2008, p. 264) concludes that the success of watershed programmes in India depends on 'integration of watershed technologies, participatory institutions and access to infrastructure and markets in a long-term framework'. In India there has also been a tremendous effort by NGOs to bring about positive changes in the spectrum of water management, water use and water and sanitation (Fayolle and Jaubert, 2007).

It is expected that institutional reform in the water sector in India would lead to a new era for the following four reasons (Saleth, 2004):

> First, although the observed changes are slow, partial, and inadequate, their direction and thrust are along desired lines. Second, the nature and tenor of these changes-both already observed and those proposed in an approved reform (World Bank, 1998)-indicate a clear commitment of the central and state governments to move ahead with the process of institutional change. Third, as the already initiated reforms begin to yield benefits, strengthen pro-reform constituencies, and reduce the technical and political costs of transacting additional reforms, the incentive balance within the institutional transaction cost framework is likely to move toward further reforms. Finally, but, more importantly, since the path dependency properties of institutional change will ensure that it is costlier to return rather than to go ahead in the reform path, further reforms are more likely to be undertaken. (p. 33)

4.11 PUBLIC PARTICIPATION IN WATER MANAGEMENT IN INDIA

The National Water Policy of 2002 guarantees participatory water management, particularly ensuring participation of women. Section 12 of the Policy states (GOI, 2002):

> Management of the water resources for diverse uses should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users' Associations and the local bodies such as municipalities and *gram panchayats* should particularly be involved in the operation, maintenance and management of water infrastructures / facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups / local bodies. (p. 5)

The Ministry of Water Resources, Government of India is implementing a 'Participatory' water management system for the farmers called 'Farmers Participatory Action Research Program (FPARP)' throughout the country with the help of 60 institutions viz. Agricultural Universities, ICAR Research Institutes, ICRISAT, WALMIS and NGOs in 25 States/UTs at the cost of Indian Rupees 24.47 Crore (nearly 1.2 million AUD) with a view to demonstrating the technologies available to farmers for increasing productivity and profitability of agriculture (GOI, 2011). In the first phase, which started in Rabi in 2007-08, a sum of Indian Rupees 21.5 Crore (approximately over 1 million AUD) was released. A total of 4912 demonstrations were completed and remaining projects are still in progress. Considering the overall benefit of the program in terms of water saving, increase in yield leading to "more crop per drop" of water, MoWR has decided to extend the program to conduct an additional 5000 demonstrations in Phase-2 at a cost of Indian Rupee 25 Crore (nearly 1.25 million AUD) during the remaining period of the Eleventh Five Year Plan i.e. 2010-11 & 2011-12. An amount of Indian Rupees 9.35 Crore (over half a million AUD) have been released for implementation of 1920 demonstrations by 23 institutes (GOI, 2011).

Due to the overwhelming dependence on the agricultural sector within the Indian economy and for the purpose of providing food security, the cost of water development and management is met by the government agencies in India (OECD, 2010). In India 'private participation is negligible and is only taking place in cases where hydropower is an issue' (Organisation for Economic-Cooperation and Development [OECD], 2010, p.5). It is evident through a research study in Maharashtra, India evaluating five different approaches to watershed management that the projects with a participatory approach had been the most successful in protecting the interests of the people in the catchment area (World Bank, 2008).

The Indian Government also recognises the importance of public participation in the water management. A strategy paper (draft) states (GOI, 2008a):

> It has now been fully recognized that user's participation in the development and management of water resources is essential to achieve the objectives of efficiency and equity in the use of available water resources and maximization of productivity. It would perhaps be worthwhile at this stage to allocate some responsibility for operation and maintenance to the user groups. Water resources development and management cannot and should not remain a governmental concern. (p. 18 of Chapter V)

Encouraging Participatory Irrigation Management (PIM), the Government of India has given a onetime functional grant to the registered Water Users Associations. In India 41,200 Water Users Associations have been formed covering an area of 8.68 million hectare throughout the country (GOI, 2008a). Necessary action is also being taken to remove the impediments in implementation of PIM by making changes in the *Irrigation Acts* of different States of India (such as *The Maharashtra Irrigation Act 1976, Bihar Irrigation Act 1997*. It is recognised that for ensuring the success of PIM there should be an effective mechanism to monitor the activities of WUAs for nationwide evaluation. Different NGOs and civil society can play a role in this process **(**GOI, 2008 a)

Swajaldhara (Rural Drinking Water and Sanitation Supply) Guidelines were adopted by the Ministry of Rural Development which is in charge of water supply in rural India in 2003. The guidelines were formulated on the basis of 'active community participation in the planning, implementation, operation, maintenance and management of water supply and sanitation schemes' (Madhav, 2010, p. 127).

In the context of historical developments in the competing use of water by three river basins of South India - Palar, Noyyal and Cauvery - it has been argued that even though the government's policies may have failed to tackle the water crisis, community engagement through 'Multi-stakeholder Dialogue (MSD) could achieve a delicate balance between livelihood and water as a resource' (Janakarajan, 2006).

4.12 LEGAL ISSUES OF THE WATER SECTOR IN INDIA

Water law development in India is briefly presented by Cullet and Gupta (2009) in different periods, pre-colonial, post colonial and the most recent period. Legal and institutional reforms in the water sector over the last two decades which created a significant impact on the management of water resources in India (Madhav, 2010). The current focus on 'governance and cost recovery' resulted in limited attention to other important issues of water management such as 'equity and sustainability' (Madhav, 2010, p.110). Madhav (2010) gives a brief account of the water resources availability in India:

> Almost 80 per cent of drinking water needs are met from groundwater. Out of the 432 Billion Cubic Metres (BCM) of replenishable groundwater in the country, only 396 BCM is utilizable-70 BCM for domestic purposes and 326 BCM for irrigation. (p. 112)

India has a largely centralised power mechanism for planning, managing and financing its water resources. Legislation of water primarily originates from the colonial period and those laws are based on common law principles (Madhav, 2010).

Article 372 of the Indian *Constitution* provides continuation of certain laws which form necessary water legislation. Article-15, para-2 of the Constitution provides equality and a basic right to water to all citizens while Article 21 entrenches a right to life (which includes right to water by interpretation). Article 37, 39 (b), Article 51 A(g) of the Constitution are about water jurisdiction of the State and citizens and States obligations in respective areas. Under India's federal system of governance certain water related powers are vested in the central government such as Article 262 of the Constitution relating to 'development of inter-state rivers and the power to resolve water related disputes' (Madhav, 2010, p. 120). The Indian Parliament enacted the *River Boards Act*, 1956 which is not effective (Madhav, 2010). The *Inter-State Water Disputes Act* 1956 (further amended in 2002) was also enacted to tackle water disputes between and among States. However, Richards and Singh (2001) show that despite the presence of the *Inter-State Water Disputes Act* 1956, disputes on water sharing between/among different States in India are continuing due to a lack of robust legal regime in this regard. Madhav (2010) narrates that none of the States of India has any law

relating to water that provides adequate justification for water allocation between different groups in their respective states.

The basic structure of water law in India is that the country has developed and enacted different laws related to embankments, transportation, irrigation, groundwater, water pollution and water quality based on common law principles since the colonial period.

Cullet (2011) argues that in recent years mainly due to internationalization of environmental issues related to climate change, an imperative has arisen of tackling water related issues at the international level. Water is a critical element in climate change policy (Bates, et al., 2008). India has developed a regime of law in respect of water sharing within its border as well as with neighbouring countries such as Bangladesh, Nepal and China. India has bilateral water sharing agreements on the Indus River with Pakistan, water sharing agreement on the Ganges River with Bangladesh, water sharing on the Koshi and Mahakali Rivers with Nepal and a Memorandum of Understanding (MOU) on the Barmpaputra River with China. Being a regional power, India would probably require in future a 'regional framework of river basin management' comprising basin states such as China, Bangladesh, Bhutan and Nepal (Babel and Wahid, 2008)

The UN Convention on the Non-Navigational Uses of International Watercourses which was adopted in 1997 is considered an important legal instrument to deal with freshwaters. As of now 30 countries have ratified the Convention Niger became the 30th country which joined the Convention on 20 February 2013. The Convention needs to be ratified by 35 countries. Loures, Rieu-Clarke and Vercambre (2012) present a detailed summary of the Convention and argue that it is essential to convince countries around the world to come forward to ratify the convention for enabling its entry into force. The Convention would facilitate promotion of equitable utilisation and environmental protection of international waters which would lead to greater regional cooperation and help top achieve sustainable development including achieving MDGs (Loures, Rieu-Clarke and Vercambre, 2012). This has not been the case even though the Convention could be utilized to develop regional basin organization or a regional agreement for water sharing (GWP and IBNO, 2009). To form a regional basin organization needs strong 'political will' from the leaders of the involved countries (GWP and IBNO, 2009).

Indian water sector reforms are guided by 'certain discourses' which have a bearing on the water law development in the country as well as in other developing countries (Madhav, 2010). These discourses are firstly, water should be used as an economic good (which forces water policy to be based on full cost recovery), water sector reforms should promote decentralisation and greater participation of water users and thirdly, water sector reforms include several proposals that change the role that government from that of a service provider to a regulator (Madhav, 2010, p. 127-128). Legal reforms related to water sustainability, conservation and human right to water are yet to be set in motion in the water sector strategies of India (Madahav, 2010).

It transpires from the above discussion that laws and regulations in respect of water management in India are at the evolving stage. Civil society, community organisations and different think tanks are stimulating the debate concerning environmental, social and economic aspects of water resources. As a result the Government of India has come up to

enacting necessary laws to achieve the effective water governance for a sustainable future for the water resources of the country. This evolving legal framework in India has leverage in achieving good water governance. These changing legal instruments would be helpful to implement IMRM principles for sustainability of water resources in the country.

4.13 LESSONS FROM THE IMPLEMENTATION OF IWRM IN INDIA

Narain and Chugh (2008) examine the IWRM experiences in four Indian states – Haryana, Orissa, Maharashtra and Uttar Pradesh – where they found varying degrees of success in each state. They examined the institutional integration aspect of IWRM. Prospects and progress in respect of IWRM in each state were examined using different approaches to the issue, such as 'approaches to IWRM'; 'irrigation reforms', 'reforms in drinking water supply' and 'integration in watershed management'. They conclude that (Narain and Chugh 2008):

> ...while typically water management in the selected Indian states has been carried out in a piecemeal fashion across line departments, some states have recently woken up to the need for Integrated Water Resource Management. This has taken two forms; first, the setting up of organizations for overall water resources planning and management, and second, the establishment of boards with representation from the organisations engaged in water management. (p. 220)

From the Indian experiences of implementing IWRM principles it appears that the process is still going on, with some successes and failures as institutional reforms in water institutions are carried out by the federal and state governments. However, some resistance is being faced from the personnel of old water boards, as they are not open to change, in a regime which is still evolving its water policy, and where different stages of the process are operating simultaneously, and often contradictorily (Saravanan, 2008). Saravanan (2008) argues that:

> ...unravelling these complexities requires understanding the role and the interaction processes of the actors and the rules to design water resource institutions for a sustainable future. (p. 239)

Mohile (2005) notes that in India (as cited in Essaw, 2008):

> Integration of a well-managed basin, with an integrated plan of development by various governments, other stakeholders, water use interest and so on, to the overall satisfaction of everyone, appears to be almost Utopian. (p. 86)

GWP (2006) points out the following points in respect of the implementation status of IWRM in India:

> The main challenge is the federal structure and getting political will for reform across such as diverse country. There is a need to address serious pollution issues, conflict resolution mechanisms and pricing and cost recovery for sustainability. There is also a need to create and/or reform institutions and equip them with formal regulatory powers to improve inter-sectoral water allocations and management. (p. 35)

India is facing two major challenges of water sustainability, one is water quality and another is sufficient quantity for future needs (GOI, 2008b). The Government of India has formulated a Five Year Plan (2007-2012) to ensure the sustainability of water as well as addressing other critical issues such as tackling climate change, reducing poverty, making water management gender sensitive and formulating a right mix of water pricing. Specific programmes have been initiated such as water harvesting, watershed development and water conservation in consultation with key government agencies as well as stakeholders as enshrined in National Water Policy of 2002 (GOI, 2008b).

4.14 IMPLICATIONS FROM THE INTERNATIONAL CASE STUDIES

The purpose of the case studies was to cast some light upon institutional and implementation issues in IWRM that could be relevant to implementation in Bangladesh. India and Australia are managing their water resources with comprehensive plans to achieve economic, social and environmental sustainability. In Australia, water management practices have a long and rich history. They have achieved significant development in the water sector when compared to other countries. In India, water management practices are still in the developing stage in most parts of the country except for heavy investments in key water infrastructure by the central government as well as the state governments with the help of international donor agencies.

Given this analysis of the water governance of the two countries (Australia and India), a comparative position in respect of the level of water governance may be summarised in line with the proposed water governance approach outlined in chapter 2. This is given in Table 4.6.

Table 4.6. Water Governance in Australia and India

Issues of Water Governance	Australia	India
Sustainability (Environmental, Social and Economic)	Advanced stage	Developing stage
Institutions (Participatory, open, inclusive and Integrative)	Advanced stage	Developing stage
Critical Factors (Climate change, poverty, gender, food security and water pricing)	Advanced stage	Developing stage
International Cooperation and Laws and Conventions	Advanced stage	Advanced stage
Status of water governance	Multi-disciplinary and designed to be integrative but there are criticism over integration.	Multi-disciplinary and partially integrative.
Political Will to deliver effective water governance	Advanced stage	Developing stage

Water governance in Australia has a long history and is at an advanced stage of development. Many of the elements proposed in the 'water governance approach' have been found in water management practices in Australia. An approach of state-wide cooperation in water management is observed within the existing federation style governance in Australia where legal cooperation in water sharing exists between the commonwealth and states. This approach could be treated as similar to international cooperation. Experiences in the respect of public participation are also helpful in a sense that the debate over 'public participation' is present in both Australia and India.

In the case of India, the government, civil society and NGOs actively pursuing the participatory approach in water management. Bangladesh could learn from these experiences. Another important element from the Australian experiences is that 'political will' is important in moving forward reform measures. This element could be incorporated in the proposed water governance approach. The lessons learned from the experience of the MDB are on different issues such as policy planning for water management, public participation, achieving food security and sustainability of water, tackling climate change and a mechanism of water pricing. The legal regime of the MDB through *Water Act 2007* demonstrates that managing water resources effectively needs sound legislation. Integrated River Basin Management as demonstrated in the MDB could be useful for Bangladesh as it is lower riparian country with the neighbouring country India. The politics and debate in the MDB could be useful for Bangladesh. Negotiations of the common River Basin Management of the MDB among the different States and Territory of Australia are also relevant in respect of water sharing between Bangladesh and India. A similar process may help Bangladesh to achieve water security. The experiences of Australian water governance re-enforce the element of 'conventions and laws'.

In the case of water governance in India vis-a-vis the proposed approach, India is struggling to achieve desired developments in the areas shown in the 'water governance approach'.

IWRM is a continuous process, which has evolved over time. Implementation of IWRM principles in countries like Bangladesh needs institutional reforms with a strong political commitment as well as social, economic and environmental policy adjustment. Effective water governance requires building institutional linkages with improved accountability and transparency. Reflexive water governance should facilitate IWRM to help attain these developmental targets (Schutter and Lenoble, 2010).

The United Nations and other international bodies have a significant role to play in effective planning and efficient management of water resources. This international dimension is to be considered for designing global cooperation through international agencies is urgent given the timing of the climate change impacts on water resources. Indian experiences show that regional cooperation in water resources management with the formation of Integrated River Basin Management (IRBM) could be useful example for Bangladesh. In the proposed governance approach a new element of IRBM could strengthen water resources management in Bangladesh. Therefore, it transpires that the proposed 'water governance approach' is informed by experiences of water governance in countries like Australia and India.

It is also important for Bangladesh to consider the climate change issue seriously, being the most vulnerable country in terms of its impact. According to the Intergovernmental Panel on

Climate Change (IPCC), if the sea level rises by 53 centimetres, at least one third of the population of Bangladesh would suffer (Bates et al., 2008). Adaptation and reflexivity in managing water resources are vital for Bangladesh in the face of climate change. Institutional reform in the water sector, building an adaptive strategy to implement IWRM in coping with the climate change is crucial for Bangladesh. Experiences from Australia and India validate that the climate change issue is linked with water governance, one of the critical factors in the proposed approach. Other elements such as poverty, food security, gender and water pricing are also linked with Australian water governance (Pigram, 2006; Commonwealth Scientific and Industrial Research Organisation, 2011; McKay, 2007) and in India (Ghandi and Bhamoriya, 2009; UN-Water, 2006 b; Food and Agriculture Organisation of the United Nations, 2008; Shah, 2005). Two new elements 'political will' and 'IRBM' could be added in the proposed water governance approach, presented in the Figure 4.5 below.

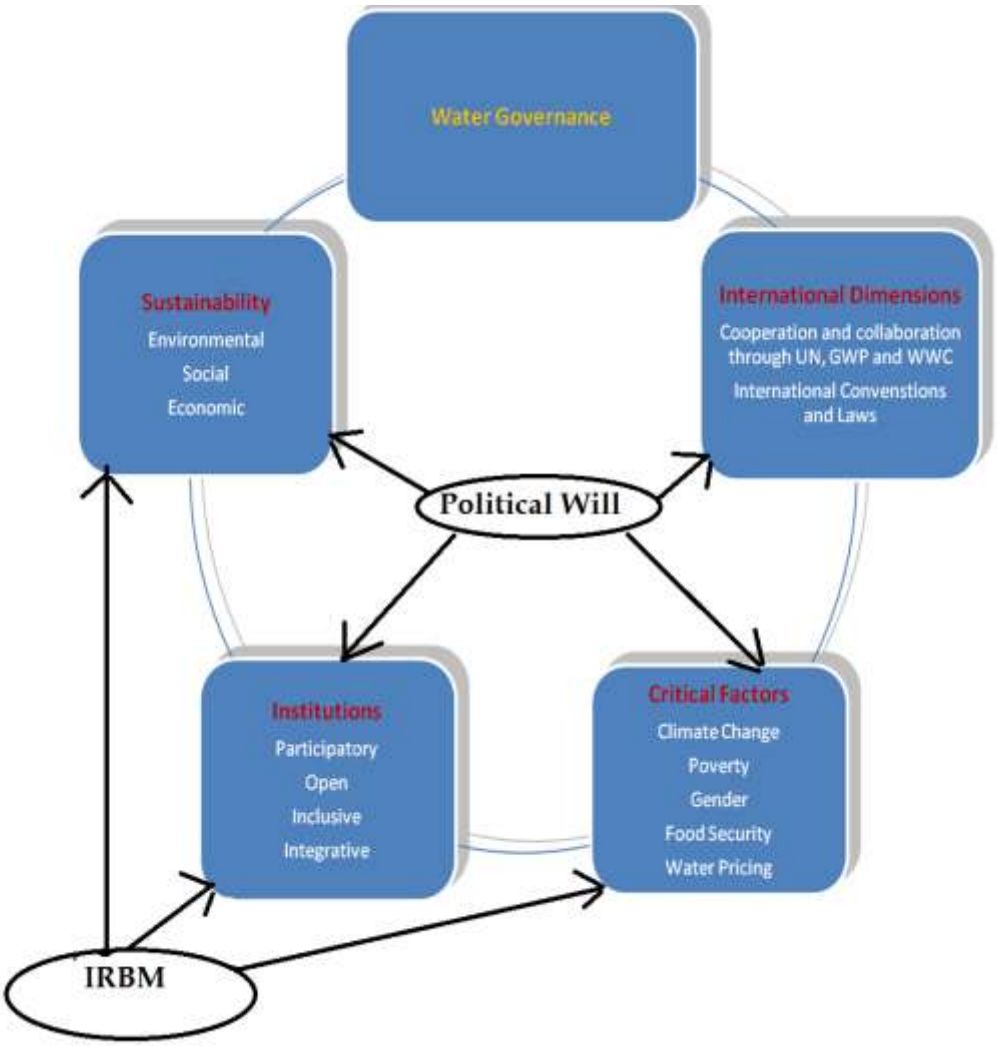

Figure 4.5: Revised Water Governance Approach incorporating 'Political Will' and 'IRBM' in the proposed approach.

The comparative case studies have highlighted some of the requirements for effective institutional arrangements and implementation to achieve IWRM in Bangladesh. In the next chapter, an institutional analysis of the water sector of Bangladesh is provided with an overview of the relations between water management and critical aspects of poverty, gender, food security, climate change and water pricing issues. This analysis focuses upon the issues that have been identified through the comparative case studies.

CHAPTER 5

BANGLADESH WATER SECTOR ANALYSIS

5.1 INTRODUCTION

This chapter presents an analysis of the water sector in Bangladesh including background, aims, approaches, institutional and governance arrangements in the context of experiences in respect of IWRM implementation. The discussion explores whether existing institutions and elements in the water sector of Bangladesh are consistent with the proposed water governance approach. In this context it is useful to examine what elements assist Bangladesh to implement IWRM principles and what elements do not assist the progress of IWRM.

Bangladesh is a riverine country with abundant supply of water with 'a per capita water availability of 8444 cubic metres in 2002' (Iyer, 2008, p. 18). Ahmad, Biswas, Rangachari, and Sainju (2001) predict that the per capita water availability in 2025 would be 7670 cubic metres. The whole water resources comprise 'water with its dissolved and non-dissolved substances and bio-organic components, and consists of different sub-system of natural landform and man-made infrastructures' (Centre for Environment and Geographic Information Services, 2003, p. 9). Bangladesh has been divided into eight hydrological regions in the National Water Management Plan (see Figure 5.1)

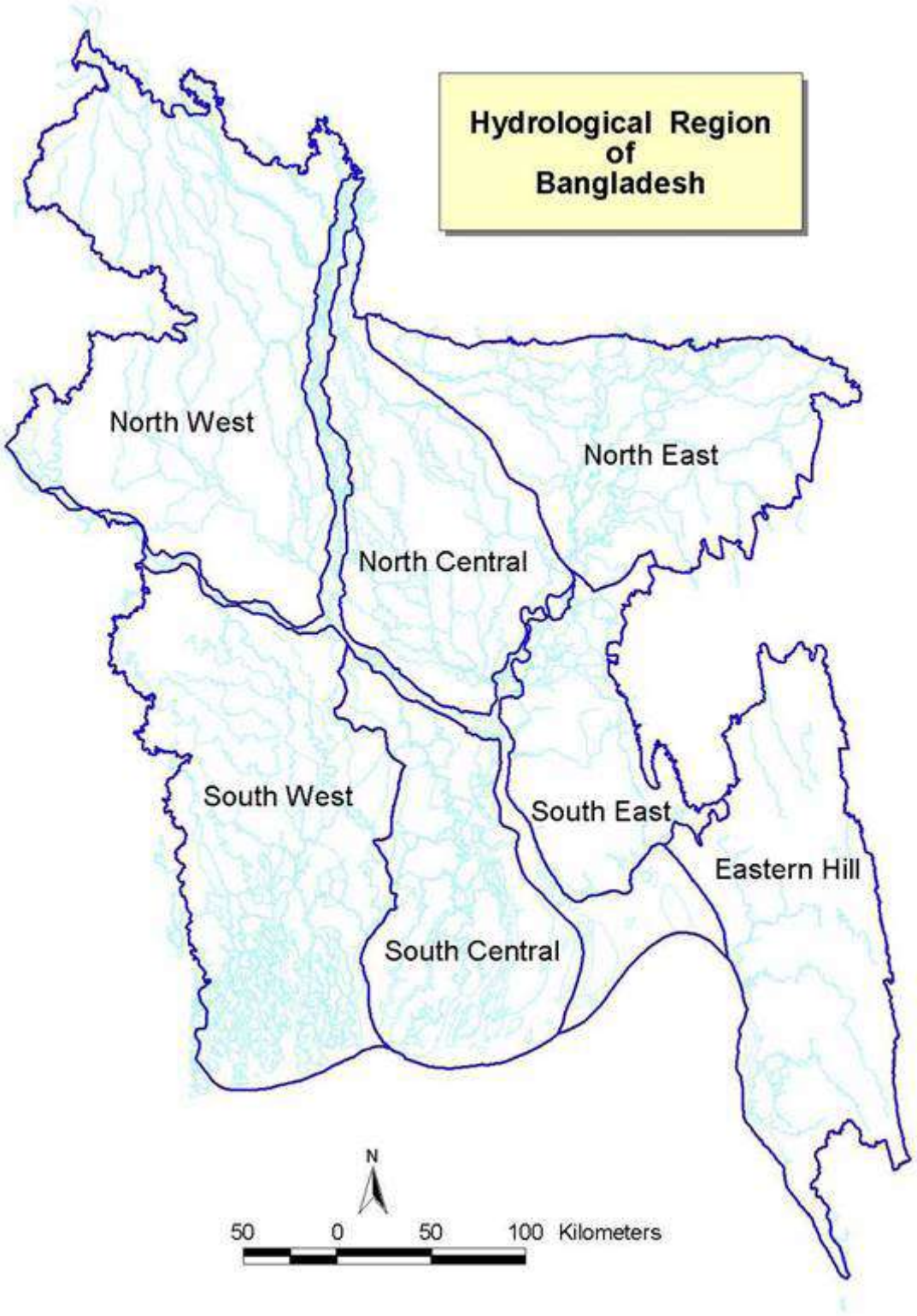

Figure 5.1: Hydrological Regions of Bangladesh, Source: Centre for Environment and Geographic Information Services (2003)

Traditionally, the water sector in Bangladesh has been considered from the perspectives of floods control, keeping the drainage system functional for navigation and maintaining irrigation for agricultural use (Centre for Environment and Geographic Information Services, 2003). Given changing scenarios, the water sector requires a 'more holistic long-term and system-wide approach' encompassing a multiplicity of functions (Centre for Environment and Geographic Information Services, 2003).

Water management throughout Bangladesh varies from region to region depending on the local needs and existing structures. Each of the water management schemes is unique and poses a different type of challenge. Ali (2002) presented the characteristics of different types of Flood Control and Drainage (FCD) schemes in Bangladesh with an analysis as follows (Ali, 2002):

> ...it is clear that the water development in FCD schemes has a wide diversity in demands and interests of the stakeholders. It shows a wide scope for integration among the various aspects of water development, especially environmental, agricultural and institutional, which has not been well addressed till now. In the past no legal framework and no water rights for stakeholders' participation in the development and management of FCD schemes were defined. Recently this has been outlined for new reclamations, as well as for improvements in the existing schemes. Conceptual understanding and recognition of the importance of operation and maintenance in FCD schemes need to be improved. (p.38)

Iyer (2008) outline the precarious condition of water management in Bangladesh and argued that the main aim of internal water management in the country is to achieve the following:

- Water availability for future needs with special reference to food security;
- The right of all citizens, in particular the poor and the disadvantaged, to have secure access to water resources;
- A voice for women in water planning and management;
- Proper priorities in allocation among different uses;
- Equity and social justice;
- Conflict prevention or resolution, and
- Resource conservation. (p. 19-20)

Iyer (2008) points out that Bangladesh faces a real challenge to managing its water resources, especially in light of the uncertainty emanating from climate change.

5.2 BRIEF HISTORY OF WATER MANAGEMENT

Since the British period the Bengal (now Bangladesh) region was recorded as being rich in water resources, even when there were few landmark laws and regulations in respect of irrigation (for instance, Bengal Irrigation Laws, Canal Laws 1874). After the devastating floods in 1954 and 1955 a United Nations mission, widely known as the 'the Krug Mission', conducted a thorough investigation into water resources planning and development in Bangladesh, which was at that time East Pakistan (Ministry of Water Resources, 2007). Following the UN mission's recommendations, the Government of East Pakistan formed the East Pakistan Water and Power Development Authority (EPWAPDA) in 1959. The Authority

was given sole responsibility of planning, design, operation and management of all water development schemes of East Pakistan (Chadwick and Datta, 2001 a).

A chronological history of water sector development in Bangladesh is presented in Table 5.1 (Ahmed, 2010).

Table 5.1 Chronological History of Policy Development in the Water Sector of Bangladesh

Year	Major Events
1952	The Embankment and *Drainage Act 1952*.
1956-1957	Krug mission fielded by the United Nations and Submission of the Report.
1958	Coastal Embankment Project (CEP) and Polder construction started under East Pakistan Irrigation.
1959	Creation of East Pakistan Water and Power Development Authority (EPWAPDA).
1964	Master Plan formulated by the International Engineering Company (IECO) of the USA recommending 58 large-scale Flood Control Drainage and Irrigation (FCDI) projects.
1965	CEP and Polder development takes place rapidly and continues till 1980s. Total number of polders constructed is about 140.
1972	EPWAPDA restructured into Bangladesh Water Development Board (BWDB) under Presidential Order.
1975	Farakka Barrage goes into trial run and continues.
1977	Indo-Bangladesh agreement on the Ganges water.
1979	Joint Government and the World Bank review of BWDB, recommends restructuring of BWDB and new National Water Plan.
1982	The Ganges agreement expires; a memorandum of understanding (MOU) is signed 1982.
1983	Master Plan Organisation (MPO) was established under the Ministry of Irrigation, Water Development and Flood Control (MoIWDFC) to prepare a long-term water resources development plan. Start of Phase I of National Water Plan.
1985	New MOU on the Ganges water 1985.
1986	National Water Plan (Phase I) completed its first report. As assessment was made on the availability of water from various sources and projected the future demand for water by different sectors.
1987-1988	Major Floods (Studies undertaken by Government of Bangladesh, UNDP, USAID, Government of Japan and France).
1989	National Water Plan (Phase II) that continues Flood Action Plan (FAP) was approved in the Donors' meeting in London held in December. FAP consisted of 11 main components and 15 supporting studies. For co-ordination of FAP activities, Flood Plan Co-ordination Organisation (FPCO) was created under the MoIWDFC.
1990	Master Plan Organisation (MPO) restructured into Water Resources Planning Organisation (WARPO) under the MoIWDFC.

Year	Major Events
1992	Systems Rehabilitation Project (SRP) of the BWDB was launched with support from the WB, Netherlands Environmental Development Agency (NEDA), EU and World Food Programme (WFP). National Minor Irrigation Development Project (NMIDP) was launched to investigate and develop the groundwater with the EU funding under the Ministry of Agriculture.
1993	MoIWDFC was re-named as the Ministry of Water Resources (MoWR). Under FPCO several Guidelines were drafted and approved. These are Guidelines for People's Participation (GPP), Guidelines for Project Assessment (GPA) and Guidelines for Environmental Impact Assessment (EIA).
1994	MoWR approved GPP and circulated for its application in new projects of BWDB.
1995	FAP Final Report was produced; Government approved Bangladesh Water and Flood Management Strategy (BWFMS).
1996	FPCO was merged with WARPO. WARPO got its extended mandate. o Initiative to prepare the National Water Management Plan (NWMP) addressing the overall resource management issues under supervision of the WARPO. o The Government of Bangladesh and India signed the Ganges Water Sharing Treaty.
1998	Major Flood both in terms of area coverage and duration.
1999	National Water Policy adopted by the Government. BWDB is mandated to implement all major surface water development projects and other FCDI projects with command area above 1000 hectares. The Local Government Engineering Department (LGED) is mandated to implement FCDI projects having a command area of 1000 hectares or less after identification and appraisal through an "interagency project appraisal committee".
2000	*The Bangladesh Water Development Board Act 2000* passed and came into force.
2004	National Water Management Plan adopted by the Government of Bangladesh.
2005	National Coastal Zone Policy.
2007	Water Management Improvement Project funded by the World Bank.

Source: Adapted from Ahmed (2010).

5.2.1 The National Water Policy 1999

The Government of Bangladesh promulgated the National Water Policy in 1999 with a spirit of managing the water resources of the country in a sustainable and integrated way. The National Water Policy of 1999 recognises 'integrated analysis of relevant hydrological, topographical, social, political, economic, environmental and institutional factors across all related water using sectors' (Government of Bangladesh [GOB], 1999). Though the explicit terminology of IWRM has not been used in this policy, the fundamental principles in line with the IWRM are enumerated in the policy (Ahmad, per. comm. 2010).

The National Water Policy (1999) of the Government of Bangladesh aims to provide direction to all agencies working with the water sector, as well as institutions that relate to the water sector in one form or another, for the achievement of specified objectives.

The National Water Policy also stipulates the following (GOB, 1999, p. 18):

> Decisions regarding water resources management can affect nearly every sector of the economy and the public as a whole, and stakeholder participation should be established in a form that elicits direct input from people at all levels of engagement. Stakeholder involvement should be an integral part of water resources management, at all stages of the project cycle. Towards that objective there should be a complete reorientation of the institutions for increasing the role of stakeholders and the civil society in decision making and implementation of water projects. The Government has to be at the core of the effort to help build the local institutions and to impart a precise awareness of the issues and an unambiguous understanding of their role in water management. Similarly, Government must lead the effort to ensure greater participation of women in this endeavour (GOB, 1999).

The Government of Bangladesh has clearly outlined specific guidelines such as 'Guidelines for People's Participation (GPP) in Water Development Projects' and 'Guidelines for formation of water user groups (WUG)'. This policy would be given effect through a National Water Code encoding specific provisions of the water policy to facilitate its implementation. The Government of Bangladesh has been taking feedback from the stakeholders on a draft Water Code, which would be finalized soon (Ministry of Water Resources, 2011).

The National Water Policy also deals with the following issues (Ali, 2002; GOB, 1999):

- River basin management;
- Planning and management of water resources;
- Water rights and allocation;
- Public and private involvement;
- Institutional policy for the various public departments and their future working;
- Environment;
- Public water investment;
- Water supply and sanitation;
- Water and agriculture;
- Water and industry;
- Water and fisheries and wildlife;
- Water and navigation;
- Water for hydropower and recreation;
- Water for the environment;
- Water for preservation of *haors*, *baors* and *beels [wetlands of different sizes]*;
- Economic and financial management;
- Research and management, and
- Stakeholder participation.

The National Water Policy clearly articulated that water institutions of the country would be reformed (GOB, 1999). This policy also recognises the need to create necessary legislation to effectively manage the water resources in the country as the policy outlines below (GOB, 1999):

- To periodically review the provisions of the body of laws and regulations that have an impact on water resource management and to recommend changes and amendments in them for efficient coordination of the work of different water-related sub-sectors, and

- To enact a National Water Code revising and consolidating the laws governing ownership, development, appropriation, utilization, conservation and protection of water resources. (p. 21)

It is also stipulated that this policy 'will be reviewed periodically and revised as necessary' (GOB, 1999, p. 21).

The policy outlines given in the National Water Policy of Bangladesh reflects that a comprehensive mechanism has put in place for effective and good water governance in the country. However, there is real challenge in integration and coordination to achieve those objectives which require a robust institutional and legal framework.

5.2.2 The National Water Management Plan, 2001 (adopted in 2004)

The Government of Bangladesh adopted the National Water Management Plan (NWMP)-2001 in the year 2004, including IWRM rhetoric. This plan has three central objectives consistent with the aims and goals of the Water Policy of the country. These objectives are (GOB, 2004):

- Rational management and wise use of Bangladesh's water resources;
- People's quality of life improved by the equitable, safe and reliable access to water for production, health and hygiene, and
- Clean water in sufficient and timely quantities for multi-purpose use and preservation of the aquatic and water dependent eco-systems.

The National Water Management Plan consists of the following main four components (Ali, 2002; GOB, 2004):

- A consensus document consolidating the policy and strategy framework set by the Government within which water sector plans are to be developed;
- A long-term water management programme up to 2025, and within this a priority programme until 2005, identifying structural and non-structural measures to be implemented at national and regional level, and their expected impacts;
- An investment portfolio of national, regional and sub-regional projects, prepared by sector Agencies and screened by the Water Resources Planning Organisation, and
- A special report on the Ganges dependent area including recommendations on alternatives for the augmentation of dry season flow, including the Ganges Barrage.

These policies and the development strategy together provide an extensive framework for management of the water sector. The efficient design of water services will depend on the principles established for management of the massive urban expansion expected over the next 25 years. The National Water Policy, through its stated goals, lays the foundation for the development strategy for the NWMP. This Strategy, agreed by the Government of Bangladesh as guidelines for the Plan, places equal importance on each of the national goals of the following aspects (GOB, 2004):

- Economic development;
- Poverty Alleviation;
- Food Security;
- Health and Safety;
- Standard of living, and
- Protection of the Natural Environment.

The NWMP is to be implemented by line agencies and others as designated. Each organisation is responsible for planning and implementing its own activities and projects within the NWMP framework. Projects may be designed to implement part of a programme or aspects of one or more programmes. This is a matter for the agency in question to determine on the basis of practical experience, current knowledge and capacity. Sequential and technical linkages between programmes have been identified. All projects will adhere to normal Government administrative procedures and will conform to rules and guidelines issued by Government. Responsibility for overall coordination of the Plan's implementation lies with the National Water Resources Council, who will issue directives as required through its Executive Committee (GOB, 2004).

For effective implementation of NWMP, experts suggest that there should be periodic evaluation on the basis of the following criteria (Centre for Environment and Geographic Information Services, 2003):

- Assessment of problems based on: (i) demand projections and the estimates of the available resources (made by the monitoring group); and (ii) the state of the water resources system, in particular with regard to its developments;
- The identification of the policy objectives for water management (National Water Policy; 5-year plans; sectoral plans) and their translation into planning objectives and corresponding Decision Support Criteria: this will establish the overall assessment framework;
- The identification and feasibility assessment of structural and non-structural measures: this includes different kinds of physical structures, but also such measures as pricing, extraction quota and zoning;
- The formulation and impact analysis of alternative strategies: strategies are combinations of identified measures, which are analysed under different scenarios, for example, water availability from upstream countries and demographic and economic developments;
- Public consultations to discuss problems, objectives and possible measures or strategies;
- The development of the required database and construction of models: this is driven by the policy priorities, problems and identified measures, and

- The evaluation of alternative strategies: this involves application of the assessment framework defined in the beginning of the study and can be supported by a multi-criteria analysis (MCA). This would include an institutional analysis on aspects of implementation. (p. 1)

The Centre for Environment and Geographic Information Services (2003) also suggests that to implement 'structured planning procedures' as mentioned above there should be a 'structured preparation'. They suggested the following three major activities (Centre for Environment and Geographic Information Services, 2003):

- The establishment of an operational network of government agencies, which will be involved in the planning process;
- The further development of participatory approaches, based on the experiences during the present NWMP, and
- The development of a framework of analysis (in close coordination with CEGIS and Institute of Water Modelling (IWM) for the formulation, analysis and evaluation of alternative management strategies.

The National Water Management Plan has a vision and dynamism. The Plan stipulates detailed mechanism to implement programmes and plans to achieve sustainable water governance in the country. However, as argued above, there is a challenge of participation of all stakeholders, coordination among all institutions and implementing effective strategies to achieve targets in the Plan.

5.3 INSTITUTIONAL ARRANGEMENTS

The National Water Policy recognises the need for better coordination and performance of water institutions. It envisages two critical 'principles' to redesign the water institutions to implement the policy for sustainable development and use of the water resources in the country (GOB, 1999):

> Firstly, there should be separation of policy, planning, and regulatory functions from implementation and operational functions at each level of government. Secondly, each institution must be held accountable for financial and operational performance. (p.23)

The National Water Policy of 1999 has identified the following institutional arrangements responsible for bringing about reforms in the water sector.

5.3.1 National Water Resources Council (NWRC)

The National Water Resources Council (NWRC) established in 1980s is the highest national body relating to the water sector. The NWRC is chaired by the Honourable Prime Minister and consists of 47 members. The NWRC coordinates all water resources management activities in the country and particularly (GOB, 1992).The role it includes responsibility to:

- Formulate policy on different aspects of water resources management;
- Provide directions for optimal development and utilisation of Water Resources;
- Oversee the preparation and implementation of the NWMP;

- Provide directions on the development of institutions in the water sector agencies, and
- Look after any other matter that may require its attention in the water sector.

5.3.2 Executive Committee of National Water Resources Council (ECNWRC)

To support the NWRC, there is an Executive Committee of the NWRC (ECNWRC), chaired by the Minister of Water Resources, which has 15 members. The ECNWRC has the following responsibilities (GOB, 1992):

- Provide directives on all matters relating to the planning, management and coordination across all sectors, as may be required by the NWRC;
- Guide water management institutions at the national, regional and local levels in the formulation and implementation of policies and plans for improved water management and investment;
- Advise the NWRC periodically on matters of water resource management, and
- Undertake any other function, as may be required from time to time, by the NWRC.

5.3.3 Ministry of Water Resources

In Bangladesh there are 35 central government agencies under 13 Ministries which are linked with water sector activities in the country (GOB, 2004).

The Ministry of Water Resources (MoWR) is the executive agency responsible for all aspects of the water sector. In addition to the Minister and State Minister, the MoWR consists of the Secretary, an administrative group of officers (civil servants) and a small Planning Cell.
The main functions of this Ministry have been outlined in the National Water Policy of 1999 as follows (GOB, 1999):

- Exercise water allocation power in identified scarcity zones on the basis of specified priorities and determine the priority for allocating water during critical periods;
- Sustain shallow groundwater aquifers, regulating the extraction of water in identified scarcity zones with full public knowledge;
- Prepare specific drought monitoring and contingency plans for each region experiencing recurrent seasonal shortage of water etc;
- Empower local government or any other body, to allocate water in scarcity zones during periods of severe drought, monitor the water regimes and enforce the regulations etc;
- Confer water rights on private and community bodies to provide secure, defensible and enforceable rights to ground/surface water etc, and
- Ensure the minimum requirement of stream-flows for maintaining the conveyance of the channel.

Under the Government Ministries, there are numerous Agencies responsible for dealing with issues related to water resources in the country of which the following agencies are major bodies entrusted with implementing different activities in respect of the water sector in the country.

Water Resources Planning Organisation (WARPO)

The Government of Bangladesh enacted the *Water Resources Planning Law 1992* (GOB, 1992), where the Water Resources Planning Organisation was formed to create a proper planning process for the water resources in the country. The main responsibility of WARPO is to act as the Executive Secretariat of ECNWRC. The WARPO is the exclusive government institution for macro-level water resource planning. The main functions of this body are outlined below (GOB, 1992):

- To prepare a Water Resources Master Plan for the development of the water resources of the country having full regard to environmental compatibility;
- To determine national policies and strategies for the scientific utilisation and conservation of the water resources;
- To provide consultancy services to other organisation involved in the development, utilisation and conservation of water resources;
- To assist in the organisation and conservation of water resources and to conduct in this connection special surveys if necessary;
- To review and evaluate the impact of actions taken by any organisation involved in the development, utilisation and conservation of water resources and to offer counsel in those matters;
- To improve the level of education, training and professional standards related to the utilisation of water resources;
- To collect and review information related to the utilisation of the water resources and to arrange for its dissemination;
- To arrange and conduct national and international seminars, conferences and workshops related to water resources with prior approval of the government for international events, and
- To perform any other duties assigned by the government in connection with the water resources.

Bangladesh Water Development Board (BWDB)

Since 1959, when the state was known as East Pakistan, the principal water agency, known as the East Pakistan Water and Power Development Authority has been in existence. It later came to be known as the Bangladesh Water Development Board (BWDB). The BWDB as the principal agency of the government for managing water resources of the country has been entrusted with the responsibility of accomplishing the tasks of executing flood control, drainage and irrigation projects to enhance the productivity in agriculture and fisheries. In 1972, right after the independence of Bangladesh, the BWDB was formed under the Bangladesh Water and Power Development Boards Order 1972 (P.O. No. 59 of 1972) as an autonomous agency to manage water. After promulgation of the National Water Policy of 1999 and preparing the National Water Management Plan, it was felt that the BWDB needed to be reorganised and reformed. Therefore, the *BWDB Act, 2000* was passed. The management of BWDB is now given to a policy and oversight Governing Council (GC) having thirteen Members headed by the Minister for Water Resources. As per the *BWDB Act 2000*, the main functions of the BWDB are as follows (Kawsher, 2010, per. Com.):

Structural Functions:

- Construction of dams, barrages, reservoirs, embankments, regulators or other structures for development of rivers, flood control, drainage, surface irrigation and drought prevention;
- Re-excavation/de-siltation of water channels and removal of obstacles from the mouths of rivers for improvement of water flows or diversion of water for assisting fisheries, navigation, forestry, wildlife development and up gradation of the environment;
- Soil conservation, land accretion, land reclamation and estuary control;
- River training and river bank protection;
- Construction and maintenance of coastal embankment;
- Prevention of salinity intrusion and desertification, and
- Harvesting of rainwater for Irrigation, Environment Preservation and Drinking Water.

Non-structural Functions:

- Flood and drought forecasting and warning;
- Hydrological survey and investigation;
- Development of forestry and fishery on land around the Board's infrastructure;
- Basic and applied research, and
- Establishment of water user's association and other water users/stakeholders' organizations, their training and participation, in project planning, implementation, O&M and cost recovery.

Institute of Water Modelling (IWM)

In 1986 the Government of Bangladesh launched 'The Surface Water Modeling Program' (SWSMP) under the former Master Plan Organization (MPO), which is now known as WARPO. The objective of the program was to develop an analytical predictive tool, such as mathematical modeling for planning and design analysis and to institutionalize the capability as an integral part of the National Water Planning Process. Two devastating floods in 1987 and 1988 in Bangladesh demonstrated that a scientific and sophisticated analysis of the given water resources of the country was required.

The government established the Surface Water Modeling Centre (SWMC) under DANIDA aided SWSMP-II (1989–1993) which continued improvement and consolidation of technology under SWSMP III (1994–1996); management of SWMC was transferred to the SWMC Trust in December 1996. It was renamed as the Institute of Water Modeling (IWM) on the 1st of August, 2002 in line with its function of generating learning through its studies and research (Institute of Water Modelling, 2010).

The main objective of the IWM was 'enhancement of hydraulic and hydrologic knowledge base of the country to enable better planning and design studies of the country's water management investments' (Institute of Water Modelling, 2010).

Centre for Environmental and Geographic Information Services (CEGIS)

The Bangladesh government set up the Centre for Environmental and Geographic Information Services (CEGIS) as a public trust in 2002 under the *Trusts Act of 1882* under the Ministry of Water Resources. Since then the organization has been engaged in developing the country's capability for 'effective and efficient management of natural resources' (Centre for Environment and Geographic Information Services, 2010).

The Centre for Environment and Geographic Information Services has been carrying out the following activities (Centre for Environment and Geographic Information Services, 2010):

- Integrated environmental analysis using modern technologies such as geographic information system (GIS);
- Remote sensing (RS), databases and information technology (IT) and others, and
- Providing solutions to problems in various sectors like water, land, agriculture, fisheries, environment, engineering, power, energy and transportation, and recommending technical options that are feasible from the socio-economic and institutional point of view.

The Centre for Environment and Geographic Information Services has a team of multidisciplinary experts, including highly qualified scientists and technical professionals who deliver quality research and policy guidelines in the area of environment and water resources, among other important issues (Centre for Environment and Geographic Information Services, 2010).

Local Government Engineering Department (LGED)

The development and management of water resources, which cover an area less than 1000 hectares is under the Local Government Engineering Department's jurisdiction, while those more than 1000 hectares are under the jurisdiction of the BWDB. The LGED executes the projects in consultation with stakeholders from inception to operation and maintenance (O&M). The WMCA (Water Management Cooperative Association), an elected committee, is in charge of the management of these projects.

The main activities of the LGED in respect of small-scale water resources are as follows (Local Government Engineering Department, 2011):

- Construction of flood protection embankment;
- Conservation of water for irrigation and improvement irrigation systems;
- Construction of water control structures and Rubber Dams;
- Excavation and re-excavation of Canals, and
- Training of stakeholders and WMCA members.

There is a unit under the LGED called the Integrated Water Resources Management Unit (IWRMU). The main functions of this unit are:

- Planning and Design;
- Implementation;

- Operations and Maintenance;
- Monitoring and Evaluation;
- Policy Advice;
- Coordination, and
- Environment, Social and Capacity Building.

Department of Public Health and Engineering

The Department of Public Health and Engineering (DPHE) is the national lead agency for provision of drinking water supply and waste management, excepting Dhaka, Narayanganj and Chittagong cities where the Water and Sewerage Authority (WASA) operates. The DPHE delivers the following services (Department of Public Health Engineering, 2011):

- Water supply and sanitation facilities throughout the country excluding Dhaka and Chittagong cities and Narayanganj and Kadamrasul Pourashavas, where WASAs operate;
- Provision of advisory service to the government in framing policy and action plans for WSS, and
- Provides support to the local government institutions (LGIs) in the development and O&M of the water and sanitation facilities.

The Institutional framework of the water sector of Bangladesh is given in Figure 5.2.

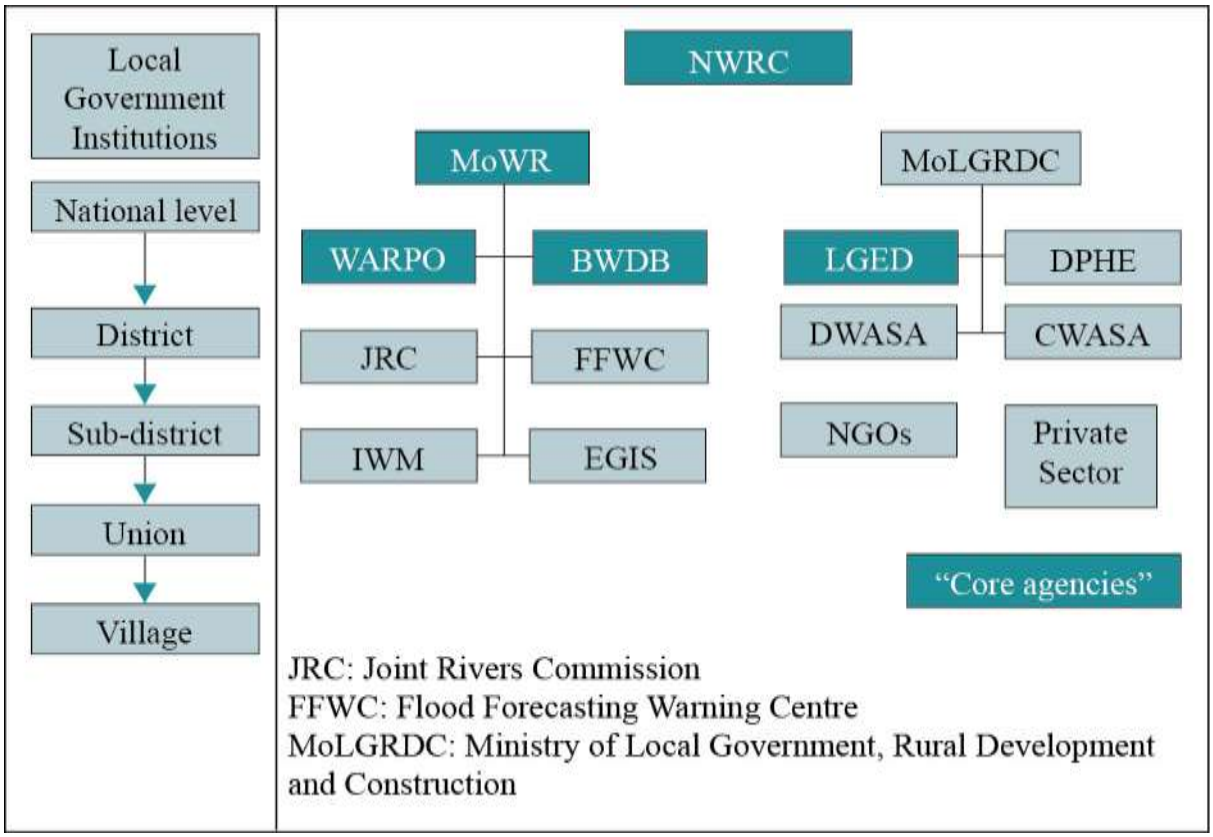

Figure 5.2: Institutional Arrangements of water sector in Bangladesh, Source: Adapted from Gupta, et al. (2005).

5.3.4 Conclusions

The above description suggests that Bangladesh has been active in formulating required policies and plans to reinvigorate water institutions in the country. It appears that the required framework is in place for better coordination and performance to deliver water services and materialise the principles of IWRM. However, the desired targets to achieve IWRM principles in the water sector have not yet achieved (Gupta et al., 2005).

The Asian Development Bank and Water Resources Planning Organisation (2009) conducted a detailed study on the status of IWRM implementation in Bangladesh. The Study concludes that the following elements are responsible for hindering the progress of IWRM implementation in the country:

- Stakeholders' lack of information about the water situation and possibilities for change. More effort needs to be made at educating stakeholders leading to more informed dialogue.
- Compartmentalized administrative departments with insufficient dialogue and coordination between sectors and users. The National Water Resources Council, which should address this problem, has not been very active.
- Insufficient capacity at various levels to address IWRM issues in ministries, planning agencies, service delivery agencies, and local government institutions.
- Separation of responsibility for surface water quality (DoE) and quantity (BWDB, LGED, DWASA).
- General administrative reluctance to provide stakeholders, including local government institutions, with management autonomy and financial control over larger water management systems
- The overly centralized and supply driven nature of public agencies, which tend to emphasize new construction rather improvement of services, leading to inequitable service distribution with the poor suffering most. (p. 45)

Asian Development Bank and Water Resources Planning Organisation (2009) suggest comprehensive reform measures to be taken to advance the implementation of IWRM principles in Bangladesh.

It appears that relevant institutions for water management in Bangladesh needs further reforms to implements IWRM principles for achieving effective water governance. Given the rise of concerns in respect of environmental, social and economic aspects of water resources, particularly in the face of climate change, the country needs to strengthen institutional mechanism to achieve a sustainable future for the water resources of the country. These improved institutions would facilitate in achieving effective water governance which ultimately helps to implement IMRM principles.

5.4 PUBLIC PARTICIPATION IN WATER MANAGEMENT

Participation by stakeholders in the decision making in the planning and development of water resources is recognised as one of the fundamental principles (Dublin Principles). Public participation is also given due importance by the Global Water Partnership (described in

Chapter 2).In the policy documents of the Government of Bangladesh, particularly in the National Water Policy and National Water Management Plan, participation by the stakeholders is also recognised. As a result, in 2000 the Government prepared Guidelines for Participatory Water Management (GPWM) where the basic principles and mechanism to deliver effective participation are outlined. Participation is defined in this document (GPWM) as 'An important voluntary process in which local stakeholders influence decisions concerning a water resource project/sub-project/scheme' (GOB, 2001, p. vii).

The policy document (GPWM) also defines 'Participatory Water Management' as 'A process by which the local stakeholders are directly and actively involved in identification, planning, design, implementation, operation and maintenance and evaluation of a water resource project/sub-project/scheme' (GOB, 2001, p. viii).

The short term and immediate objectives of the guidelines are as follows (GOB, 2001):

- Elaborate the provisions incorporated in National Water Policy of 1999 in respect of stakeholders participation/involvement;
- Make available harmonised Guidelines for Participatory Water Management for application in the field;
- Increase/improve stakeholder participation/involvement in water management;
- Give local stakeholders a decisive voice at all stages of water management, and
- Raise environmental awareness among local stakeholders and implementing agencies involved with participatory water management. (p. 2-3)

The guidelines also stipulate the long-term objectives to formulate the policy document as narrated below (GOB, 2001):

- Develop capacity of the local stakeholders in participatory water management;
- Gradually establish ownership of local stakeholders in water resource management, and
- Achieve sustainable participatory water management. (p. 3)

A common practice in preparing a water project by the Bangladesh Water Development Board (BWDB) is public consultation through 'public participation' as per the GPWM. A photo of a public participation meeting is presented below at Figure 5.3.

Figure 5.3: Public Consultation with the local people for a water project in Bangladesh. Source: Kawsher, 2010, per. comm.

The GPWM identifies different stakeholders in 'participatory water management', shown in the figure 5.4 (GOB, 2001, p.5).

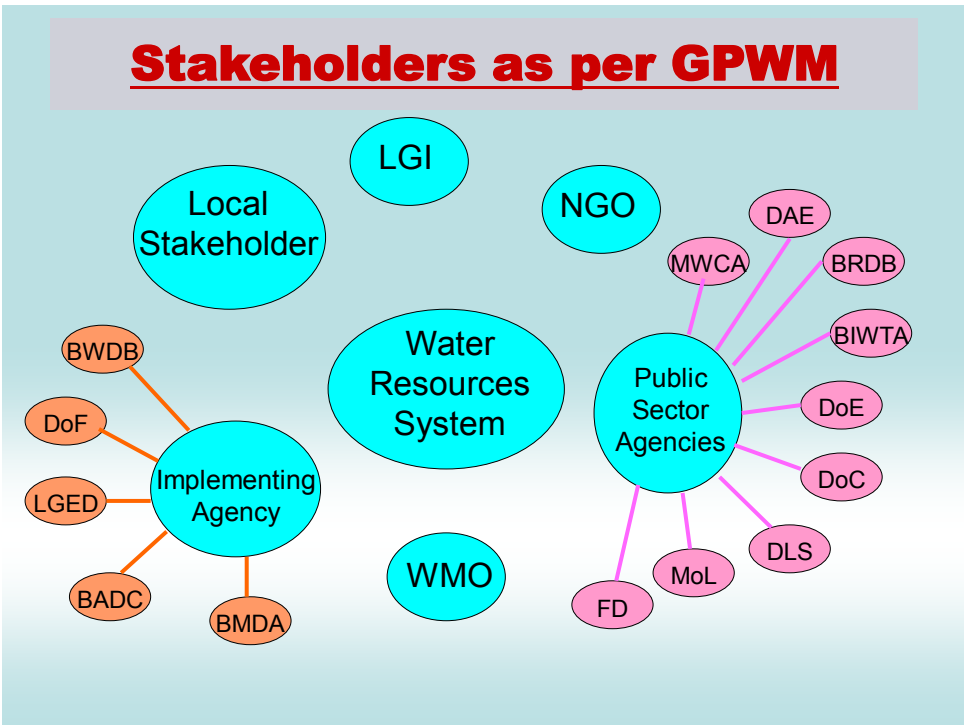

Figure 5.4: Stakeholders in Participatory water management in Bangladesh. Source: Kawsher, 2010, Per. Comm. Adapted from GOB (2001).

(Note: Local Stakeholders include ordinary citizens, farmers, fishermen, women, men of the locality LGI-Local Government Institutions, such as Union Parishad, Upazila Parishad and Zilla Parishad.).

The GPWM also elaborates the 'participatory process' in executing a water project in the country. It narrates six stages in implementing a water project which is shown as 'Project Cycle' in the diagram at Figure 5.5 (GOB, 2001).

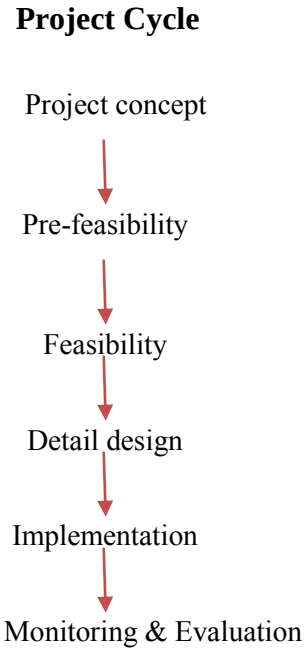

Figure 5.5: Stages of the Project Cycle of a water project through participatory process.

An in-depth study on 'Institutional Studies for Legal Framework of Water Management Organisations', conducted by the Government of Bangladesh found that the GPWM is adequate to deal with water projects in the country (GOB, 2006). The study suggested a few strategies in respect of implementing the recommendations of which the following two are relevant to the GPWM (GOB, 2006):

- Accepting that some fundamental changes are suggested, the GPWM provides the basic framework for organising the WMOs. GPWM guidelines on stakeholders, participatory process and capacity development are valid and need to be followed**,** and
- There is no need to undertake any revision of the GPWM at this point of time. Whatever recommendations made in the Report are accepted by the respective Ministries, the concerned agencies should extract so much of the provisions from the Guidelines as are appropriate in the revised methodology and circulate them for use as an interim measure. Revision may be taken up after the revised methodology has been allowed to run for a couple of years and sufficient information has been collected to justify such undertaking. (p. 57)

Ali (2002, p. 158) also points out the need for stakeholders' participation right from inception of a water project for streamlining institutional arrangements as he concludes:

> The best approach is when the stakeholders through discussion in meetings develop the institutional arrangements. Agency staff should communicate with the stakeholders to assure that the combined roles and responsibilities of Agency and stakeholders guarantee a sustainable water management.

However, despite the above mentioned strengths of the guidelines for participatory water management (GPWM), it has legal weaknesses. There should have provision for periodic review of the guidelines as well.

5.5 LEGAL ASPECTS

Traditionally, water resources management in Bangladesh has been controlled and managed by public sector bodies. In the mid eighties the Government of Bangladesh started privatisation of the ownership of the majority of the tube well programmes in the country except for a few large water schemes. The National Water Policy of 1999 also set the target of handing over the ownership and responsibility for management of small-scale flood control and drainage (FCD) and flood control and drainage and irrigation (FCDI) schemes up to 1000 hectare to local organisations. The National Water Policy also outlines that public sector institutions should use private providers of specific water resources services. The BWDB Act was thoroughly revised in 2000 to accommodate the policy changes in the National Water Policy.

The National Water Policy recognises the need for periodic update of legislation concerning water resources, including enacting a National Water Code (GOB, 1999).

The Government of Bangladesh has been developing policy frameworks for the water sector for overall development of the country with specific objectives to (Asian Development Bank and Water Resources Planning Organisation, 2009, p. 16):

- Alleviate poverty and provide sustainable economic growth;
- Provide food security;
- Promote public health and safety, and
- Protect the natural environment.

The Asian Development Bank and Water Resources Planning Organisation (2009) reviewed the relevant policy documents of the government of Bangladesh related to water resources. The study concludes that though these policies contribute towards development of participatory and sustainable water management in the country, there are two fundamental problems which need to be resolved. These problems are (Asian Development Bank and Water Resources Planning Organisation, 2009):

> Firstly, these policies are not judicially enforceable according to the Constitution of Bangladesh, although they may guide and influence concerned ministries and agencies. Secondly, policies – other than for water, fisheries, and agriculture – have been developed primarily from a sectoral approach, so that they overlap in certain

areas and implementation is limited to whatever control the authoring ministry can exercise. Although advances have been made in integrating the approach to water management, work remains at the policy level. (p. 18-19)

There are 41 laws and acts related to water resources in Bangladesh. These are presented in Table 5.2.

Table 5.2: Existing Water-Related Legislation in Bangladesh

- *Revenue Sale Act (1859)* - *Land Registration Act (1876)* - *The Bengal Irrigation Act (1876)* - *Ferries Act (1878)* - *Courts of Wards Act (1879)* - *Transfer of Property Act (1882)* - *Local Self-Government Act (1885)* - *The Embankment Act (1888)* - *Estates Partition Act (1897)* - *Ancient Monuments Preservation Act (1904)* - *Registration Act (1908)* - *The Excise Act (1909)* - *Public Demands Recovery Act (1913)* - *Agriculture & Sanitary Improvement Act (1920)* - *Waste Land Manual (1936)* - *Bengal Land Improvement Act (1939)* - *State Acquisition and Tenancy Act (1950)* - *Embankment and Drainage Act (1952)* - *Inland Water Transport Authority Ordinance (1958)* - *The Agriculture Pesticides Ordinance (1971)* - *Statute of the Indo-Bangladesh Joint Rivers Commission (1972)* - *Bangladesh Water and Power Development Boards Order (1972)* - *Bangladesh Fisheries Development Corporation Act (1973)*	- *Territorial Waters and Maritimes Zone Act (1974)* - *Local Government Ordinance (1976)* - *The Environmental Pollution Control Ordinance (1977)* - *Acquisition and Requisition of Immovable* - *Property Ordinance (1982)* - *Local Government (Union Parishads) Ordinance (1983)* - *Bangladesh Irrigation Water Rates Ordinance (1983)* - *Groundwater Management Ordinance (1985)* - *Land Administration Manual (1987)* - *Land Management Manual (1990)* - *Water Supply and Sewerage Authority (Amendment) Act (1990)* - *Water Resources Planning Act (1992)* - *Water Supply and Sewerage Authority Act (1996)* - *Environment Conservation Act (1995)* - *Environment Conservation Rules (1997)* - *BWDB Act (2000)* - *Environment Protection Act (2000)* - *Preservation of Wetlands and Open Space Act (2000)* - *Bangladesh Water and Power Development Boards Order 2000*

Source: Adapted from Asian Development Bank and Water Resources Planning Organisation (2009).

There is a significant role of all these laws in managing water resources in the country, particularly those laws which are directly related to water resources, irrigation and environment. There could be a separate research on the legal aspects of effective water governance in Bangladesh. The Asian Development Bank and Water Resources Planning Organisation (2009, p. 22) conclude that though Bangladesh has enough laws related to water resources development and management, it is essential to formulate three more on a 'priority basis' which are: The Bangladesh Water Act, a revised Water Resources Planning Act and a National Water Code, which would be 'a system of law within which the water sector would assemble all of the various pieces of legislation to ensure consistency and synergy in application'.

Draft Bangladesh Water Act of 2012

The Government of Bangladesh has published a *Draft Bangladesh Water Act 2012* in accordance with the National Water Policy of 1999 to provide a legal basis for the management of water resources. The public have been invited to comment on the draft till end of March 2012. The legislation has nine chapters and 39 sections. The draft *Act* stipulates management and implementation responsibilities, ownership, distribution and use of water resources, protection of water resources, river, wetlands and water bodies rescue and handling procedures, role of water management organisations at local level, economic pricing and financial aspect of water management, general provisions and punishment and appeal procedures for violating the act. Under the act a National Water Council will be formed under the chairmanship of the Prime Minister and an Executive Committee would assist the Council. The *Act* would be implemented by the Water Resources Planning Organisation under the directive from the Ministry of Water Resources (Water Resources Planning Organisation, 2012).

The important aspect of the draft *Act* is that fundamental rights to water have been recognised but how much is the minimum entitlement has not been spelt out. Water has been considered as an economic good with appropriate pricing. However, for the poor segment of the country, a different pricing mechanism is suggested in the act. Public participation is encouraged in the *Act*. It is expected that after enactment of the proposed *Bangladesh Water Act 2012*, the development and management of water resources in the country will enjoy a new dynamism. This would facilitate water sustainability, reducing the risks from water hazards, reducing poverty and tackling climate change(Water Resources Planning Organisation, 2012).

5.6 INTERNATIONAL COOPERATION

The National Water Policy emphasizes the need for international cooperation in water management.(GOB, 1999).The Policy stipulates the need to:

- Work with co-riparian countries to establish a system for exchange of information and data on relevant aspects of hydrology, morphology, water pollution, ecology, changing watershed characteristics, cyclone, drought, flood warning, etc. and to help each other understand the current and emerging problems in the management of the shared water sources;
- Work with co-riparian countries for a joint assessment of all the international rivers flowing through their territories for better understanding of the overall basins' potentials;
- Work jointly with co-riparian countries to harness, develop and share the water resources of the international rivers to mitigate floods and augment flows of water during the dry season;
- Make concerted efforts, in collaboration with co-riparian countries, for management of the catchment areas with the help of afforestation and erosion control for watershed preservation and reduction of land degradation;
- Work jointly with co-riparian countries for the prevention of chemical and biological pollution of the rivers flowing through these countries, by managing the discharge of industrial, agricultural and domestic pollutants generated by human action, and

- Seek international and regional cooperation for education, training and research in water management. (p. 9)

Bangladesh is concerned over India's plans to undertake a massive inter-basin transfer of water by inter-linking the Himalayan and peninsular rivers of India. This could cause a major ecological and economic disaster for Bangladesh. Bangladesh has lodged an official protest with the Government of India for its unilateral plan to take up the River Inter-linking Project. The present UPA Government has given an assurance to Bangladesh that it would desist from any activity that would adversely affect the interests of the co-riparian countries, especially Bangladesh. The UPA Government has decided to initiate preparations of Detailed Project Reports on two prioritized peninsular links, that is, the Ken-Betwa and Parbati-Kalisindh-Chambal. The Indian Government has decided to defer the proposed Himalayan links at this stage in view of the implications of these links for the co-riparian countries. The Government of Bangladesh has always underscored the need for regional cooperation in water resources management in order to face the challenges of floods and droughts that afflict many parts of the region.

There are fifty-four common rivers and only one water-sharing treaty, the Ganges Water Sharing Treaty signed in 1996 and valid for 30 years between Bangladesh and India. For several years now, negotiations on the sharing of the waters of the Teesta and several other rivers have not made any visible progress. Bangladesh feels that it is necessary for both sides to seriously engage in finding mutually acceptable solutions to the technical issues. Experts believe that a regional cooperation at river basin level could enhance water security in the region (Ahmad, 2011; Tir and Stinnett, 2011; Nishat and Faisal, 2000; Elhance, 2000). A regional basin map showing three major rivers Ganges, Brahmaputra and Meghna is presented below at Figure 5.6.

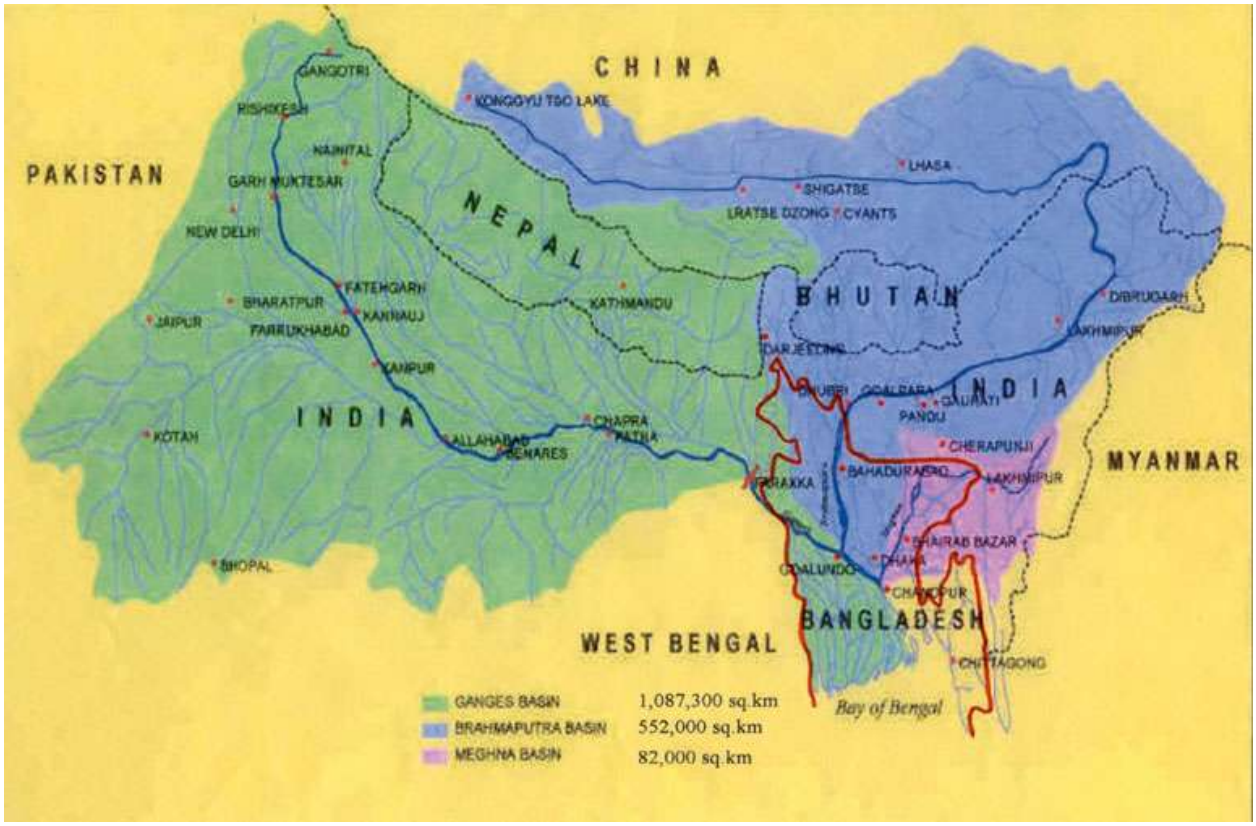

Figure 5.6: Ganges-Brahmaputra-Meghna (GBM) basin in South Asia including China, Source: GOB (2004).

Discussions at various levels have taken place, where both sides agreed to refrain from opposing development works on common rivers under the pretext of border guidelines. Initiatives have been taken by the Water Resources Ministers of the two countries during the recent Joint Rivers Commission (JRC) meetings to personally visit the affected areas and provide guidance in this regard.

5.6.1 The Ganges Water Sharing Treaty

There is shortage of extensive research on managing water resources in the Ganges basin which covers South Asian countries such as Bangladesh India and Nepal. It is different from Murray-Darling Basin and Mekong basin in the context of history and management. The Ganges basin is a long way to develop a institutional and infrastructural platform for a basin wide management to have an Integrated River Basin Management. Analysis and details of negotiations between Bangladesh and India over the share of the Ganges water has been given by Crow, Lindquist & Wilson (1995) and Abbas (1984). Shahjahan (2008) narrates the following main features of the negotiation on the Ganges water:

- India's adherence to a bilateral approach and refusal to a multilateral approach
- Flexibility of Bangladesh and Nepal to a multilateral approach
- Rigid position of each country on their own augmentation proposal
- Lack of effective institutional arrangement to implement the legal instrument
- Lack of implementation of the treaty

- Bureaucratic complexity and dishonesty is a great impediment in negotiation
- Prevailing political climate is the main driving force to negotiation (p. 147)

In 1996 a Treaty on the Ganges Water sharing for 30 years, commonly known as the Ganges Treaty was signed between Bangladesh and India. However, there is criticism about success of the treaty as it is widely reported about its failure to implement the Treaty, particularly in respect of settlement of augmentation. The main aspects of the Ganges Treaty are as under (*The Ganges Water Sharing Treaty, 1996)*:

- A water sharing arrangement between Bangladesh and India
- Cooperation for a long term solution on flow augmentation
- Review of the treaty in each five year period
- Referring to the Joint River Commission (JRC) for any dispute regarding water sharing arrangements
- Causing no harm to either party by utilisation of the basin's water

Khalid (2004) argues that the Ganges Treaty lacks suitable provision for any dispute settlement by an authority with judicial mandate. The Treaty provides to find an amicable solution to the flow of augmentation in the Ganges and lacks any specific arrangement for that (*The Ganges Water Sharing Treaty 1996, Article VIII*). However, some term the Ganges Treaty as a 'landmark' in water sharing arrangement between Bangladesh and India which opened the vista of a new approach (Salman and Uprety, 1999). According to the article IX of the Treaty, the principle of equity, fairness and no harm to either party' is recognition of well established international legal obligations of the upper riparian country towards its lower riparian country. This endorses the theory of equitable allocation and the principle of not causing significant harm to other co-basin states (Rahman, 2006).

Despite having the Ganges Treaty, both Bangladesh and India facing mistrust on implementation as there are reports that India is diverting the Ganges water by constructing barrages and reservoirs which reduced the flow at Farakka, the point of augmentation flow (Kamal, 2006). There has been no review of the Treaty since signing though there is a provision to review that in every five year period. The history of water sharing between Bangladesh and India over last nearly half century dictates that it is difficult to resolve the augmentation problem bilaterally. Bangladesh is still facing a serious problem when it comes to getting the benefits of IWRM principles due to lack of regional cooperation among riparian countries (Shahjahan, 2008; Gupta et al., 2005). Shahjahan (2008) argues that it would require a multilateral approach with all countries in the basin as well as involvement of a third party or international agency may be helpful.

5.6.2 Conclusions

In recent time, there has been some emerging trend of basin wide management indicating that countries in the region have realised that to augment the water resources for effective water governance and environmental sustainability an approach towards Integrated River Basin Management (IRBM) is essential. Bangladesh also needs to pursue adoption and ratification of international laws and conventions (such as the UN Convention on the Law of the Non-navigational Uses of International Watercourses of 1997) to protect the right of the lower riparian country. Bangladesh is at the receiving end of almost 57 international rivers with

neighbouring countries, of which 54 are common with India alone. To overcome this difficulty an Integrated River Basin Management (IRBM) approach is required (Shahjahan, 2008).

5.7 WATER SUSTAINABILITY

It has been argued in chapter 2 that to implement IWRM principles it is essential to fulfil the key aspects of sustainability – social, economic and environmental sustainability (Jonch-Clausen, 2004). In its institutional and policy instruments for water management, Bangladesh considers sustainability as one of the objectives of the National Water Policy and highlights the issue as mentioned below (GOB, 1999):

> To develop a state of knowledge and capability that will enable the country to design future water resources management plans by itself with economic efficiency, gender equity, social justice and environmental awareness to facilitate achievement of the water management objectives through broad public participation. (p. 7)

The policy of the government stipulates the environmental, social and economic sustainability measures of water resources in the country. The question remains whether this rhetoric is being implemented, which would ensure the application of IWRM principles in the country. In reality these sustainability issues are not being met, which has resulted in poor progress in IWRM implementation (Gupta et al., 2005).

Ahmad (2003, p. 273) argues that the interface between poverty and water management in Bangladesh could be traced through 'safe drinking water and sanitation, food production, impact of flood and drought and water-related health hazards'. He points out that to achieve efficient water management in Bangladesh for alleviating poverty there should be regional cooperation in trans-boundary water management, as Bangladesh is a lower riparian country in South Asia.

The National Water Policy of 1999 recognises the need for prudent water pricing mechanisms for better managing the supply and demand of water resources in the country. The policy stipulates the following (GOB, 1999):

- Water will be considered an economic resource and priced to convey its scarcity value to all users and provide motivation for its conservation. For the foreseeable future, however, cost recovery for flood control and drainage (FCD) projects are not envisaged in this policy. In case of flood control, drainage and irrigation (FCDI) projects water rates will be charged for O&M as per Government rules;
- Relevant public water supply agencies will be gradually given authority to charge for their services;
- Recovery of O&M cost will, as far as possible, be made through private collection means such as leasing and other financial options. Beneficiaries and other target groups will be given preference for such contracts;
- The pricing structure will match the goals and needs of the water provider and the population served. Water rates will be lower for basic consumption, increasing with commercial and industrial use. The rates for surface and groundwater will reflect, to the extent possible, their actual cost of delivery;

- Water charges realised from beneficiaries for O&M in a project would be retained locally for the provision of services within that project;
- Effective beneficiary participation and commitment to pay for O&M will be realised at the project identification and planning stages by respective public agencies, and
- Appropriate financial incentives will be introduced for water re-use and conservation, responsible use of groundwater and for preventing overexploitation and pollution. (p. 20)

Irrigation in the dry season has always been a crucial factor in agricultural production in Bangladesh. There are traditional and modern irrigation methods. Most commonly in rural Bangladesh, traditional irrigation methods like *doon* and swing baskets are used, which can be operated by a single person. Modern irrigation methods were introduced in Bangladesh in the 1960s for rice production in the dry season (Rasheed, 2008). The National Water Policy deals with the agricultural development to tackle food security. The policy stipulates guidelines for better utilisation of water for this purpose as follows (GOB, 1999):

- Encourage and promote continued development of minor irrigation, where feasible, without affecting drinking water supplies;
- Encourage future groundwater development for irrigation by both the public and the private sectors, subject to regulations that may be prescribed by Government from time to time;
- Improve efficiency of resource utilisation through conjunctive use of all forms of surface water and groundwater for irrigation and urban water supply;
- Strengthen crop diversification programmes for efficient water utilisation;
- Strengthen the regulatory system for agricultural chemicals that pollute ground and surface water, and develop control mechanism for reducing non-point pollution from agro-chemicals, and
- Strengthen appropriate monitoring organisations for tracking groundwater recharge, surface and groundwater use, and changes in surface and groundwater quality. (p. 11)

Bangladesh is the most vulnerable country in the world to climate change, particularly in the water sector of the country. Begum and Fleming (1997) argue that the most impact would be on the agricultural economy of Bangladesh. They argue that due to the change of morphology of the rivers and the aquatic structure of the country, there would be severe environmental degradation in the country as well. A 'comprehensive management plan' would facilitate a suitable framework for water resources management (Begum and Flemming, 1997).

Ahmad (2003, p. 274) argues that 'Bangladesh, being deltaic, low-lying and flat, is at the forefront of the adverse impact of the projected climate change and sea-level rise, which will exacerbate the problems and perhaps give rise to new ones'.

According to the scientific analysis of the Intergovernmental Panel on Climate Change (IPCC), Bangladesh would suffer adverse effects on crop production and the water sector due to climate change (Bates et al., 2008). Therefore, adaptation and reflexivity in managing water resources would be vital for Bangladesh. Institutional reform in the water sector, enacting further legislation to use the water wisely and building an adaptive strategy to implement IWRM in dealing and coping with the climate change would be crucial for developing countries like Bangladesh.

Arsenic contamination in the groundwater of Bangladesh is recognised as a serious health hazard, which was first traced in 1993 in a district named Chapai Nawabganj (Rasheed, 2008). The Government of Bangladesh has successfully contained this problem through a systematic approach with support from international donor agencies such as World Bank, DFID and USAID. Recent research suggests that there are no direct linkages between arsenic contamination and seasonal water table reduction due to irrigation from groundwater (DPHE/BGS 1999). Rasheed (2008, p. 99) argues that groundwater from deep aquifers is a 'long term source of arsenic free and safe drinking water' for Bangladesh.

Ensuring water supply and sanitation is one of the fundamental objectives of the Government of Bangladesh. The Government of Bangladesh enacted the National Policy for Safe Water Supply and Sanitation in 1998. In the National Water Policy, the matter has been dealt with by putting forward the following provisions (GOB, 1999):

- Facilitating the availability of safe and affordable drinking water supplies through various means, including rainwater harvesting and conservation;
- Preserving natural depressions and water bodies in major urban areas for recharge of underground aquifers and rainwater management;
- Mandating relevant public water and sewerage institutions to provide necessary drainage and sanitation, including treatment of domestic wastewater and sewage and replacement of open drains and construction of sewers, in the interest of public health;
- Empowering and holding responsible, municipalities and urban water and sewerage institutions to regulate the use of water for preventing wastage and pollution by human action, and
- Mandating local governments to create awareness among the people in checking water pollution and wastage. (p. 15)

It is expected that Bangladesh will reach its target of achieving MDGs concerning water and sanitation (Target 7c) by 2015 (WHO/UNICEF, 2010).

Bangladesh's socio-economic development depends on the shape and status of its hydrology (GOB 2004). Bangladesh is prone to flooding due to three reasons (GOB, 2004):

- In stream flows large enough to cause overtopping;
- Surface run-off resulting from intense precipitation events especially in the north east where they are blown in by fierce Nor 'westers, and
- Sea level rises due to cyclone and or tidal surges. (p. 117)

The NWMP envisages the mitigation approach for flooding rather than a preventive approach, with the following strategies (GOB, 2004):

- Improved warning and preparedness systems;
- Social measures based on improved or more appropriate dissemination and response procedures;
- Physical and social mitigation measures such as elevated platforms, cyclone shelters, highways and alike, and

- Multiple use of infrastructure. (p. 118)

The experts feel that there should be a regional approach for effective flood management in Bangladesh which calls for 'GBM (Ganges Brahmaputra Meghna) regional co-operation, given that only about 7 per cent of the total GBM catchment area lies in Bangladesh and 93 per cent lies in upstream countries'(Ahmad, 2003).

5.8 DETAILED BANGLADESH CASE STUDY: IPSWM PROJECT

To analyse the effectiveness of IWRM in Bangladesh a detailed case study analysis was undertaken in a selected project area of the Bangladesh Water Development Board (BWDB) where a National Water Project named the Integrated Planning for Sustainable Water Management (IPSWAM) has been carried out with the assistance from the Government of the Netherlands. This project is a significant case study for Bangladesh as the principal objective of the project is to implement IWRM in Bangladesh. A Brief description of the IPSWAM project is given in Table-5.4.

As discussed in Chapter 2, the use of a single instance cannot be considered exhaustive of the issues for all other instances. Ideally further detailed investigation of other areas of Bangladesh, with far larger numbers of people surveyed, is desirable. However, for the present purposes this detailed investigation serves to verify with "on-ground" information the indications available from the desk-top evaluation,

Box 5.1 A Project under Bangladesh Water Development Board-Integrated Planning for Sustainable Water Management (IPSWM).

The project located in the South West and Sothern Zones of Bangladesh. The project was for 5 years starting from November 2003 and ending in November 2008 with a total budget of Bangladesh Tk 970 million (approximately US$ 14 million). Government of the Netherlands provided 80% of the project cost and rest was borne by the Government of Bangladesh.
IPSWAM was conceived in a new context in the water sector in the country, including:
a. National Water Policy of 1999, b. Guidelines for Participatory Water Management of 2000, c. Restructuring of BWDB, d. National Water Management Plan of 2001 (approved in 2004)

Context: Previous lessons learned

a. Involvement of stakeholders is essential for success
b. Handing over responsibility to stakeholders is possible
c. Effective quality control is vital
d. Importance of maintenance must be recognized

Rationale and objective:

IPSWM has been planned to make operational the principles of the National Water Policy and the Guidelines for Participatory Water Management
Its objective is to strengthen the capacity of water sector organizations towards establishing sustainable water management

Key points:

Cost effective approach, High quality rehabilitation
Sustainable, participatory Organisation & Management Learn from a wide range of experiences Multidisciplinary integrated approach People's participation at all stages Special attention to gender issues Optimal institutional framework Effective dissemination The IPSWM Planning approach includes: Multi-disciplinary planning, Planning for Operation and Maintenance Participatory Planning, Planning in a regional and cross sectoral context

Source**:** Bangladesh Water Development Board, 2010, Per. Comm. from Chief Engineer, Hydrology

Photos of the IPSWAM project area in Patuakhali district (where the survey for this thesis was conducted) are furnished in Figure 5.7.

Figure: 5.7. Photos of a project site under the IPSWM taken by the Author.

Methodology and pictorial presentation of IPSWM Project are given in Figure 5.8 and 5.9 respectively.

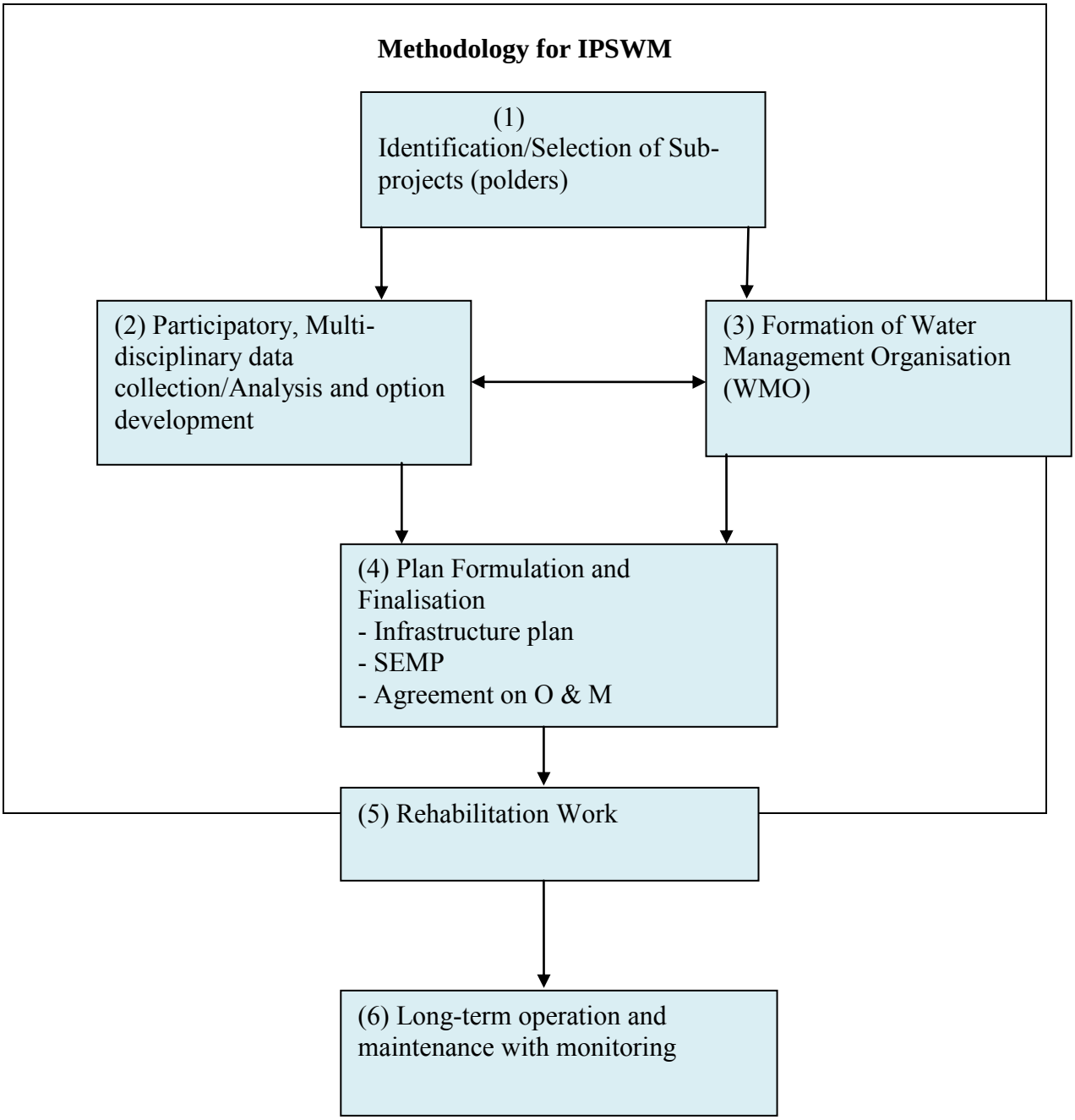

Figure 5.8: Methodology of the IPSWM Project. (Source: Bangladesh Water Development Board, 2010)

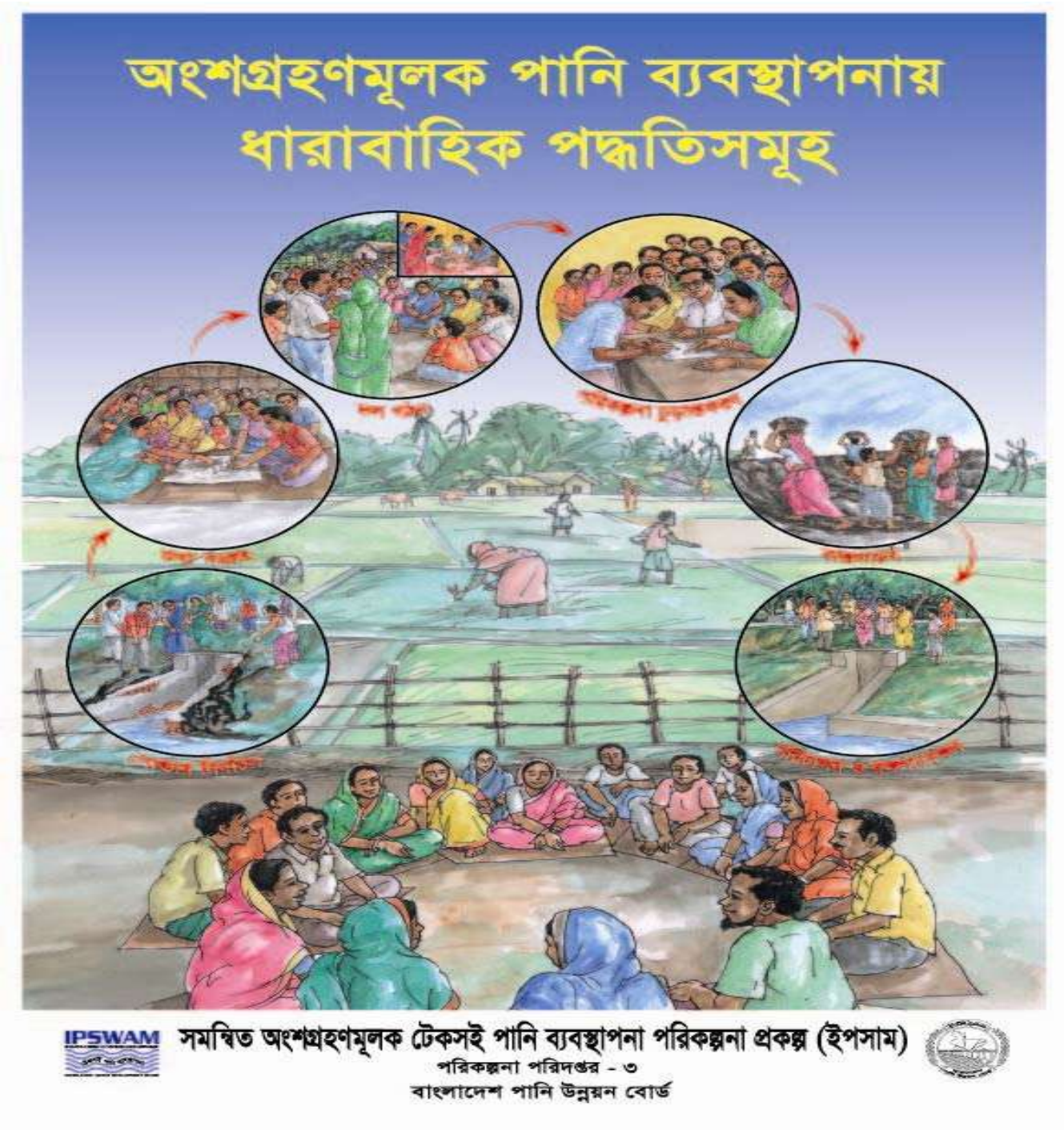

Figure 5.9: Pictorial presentation of IPSWAM project outlining the steps in the process. (Source: Bangladesh Water Development Board, 2010)

5.8.1 Assessment of IPSWM Project.

It was envisaged that IPSWM must make the basic principles of the National Water Policy (NWPo) operational. In doing so, it is drawing on the experiences of projects that have been executed in the past, and it will have to define further the practical role of some of the key players in water management in Bangladesh. Therefore, in the Project Document the objective of IPSWAM outlined was to strengthen the capacity of water sector organisations, including (Bangladesh Water Development Board, 2010):

- local level Water Management Organisations (WMOs);
- the different offices of the BWDB (headquarters and regional/local level);
- local government institutions (to a limited extent);

The methodology of IPSWM was designed to giving full attention to six principles of governance such as voice and accountability, stability, government effectiveness, regulatory quality, rule of law and corruption control (Bangladesh Water Development Board, 2010).

It was claimed by an internal assessment of Bangladesh Water Development Board (BWDB) that IPSWAM project was successfully implemented to achieve effective water governance. The project has contributed to the improvement of the overall water governance conditions in Bangladesh in the following ways (Bangladesh Water Development Board, 2010):

- By increasing mutual understanding and confidence between local participatory institutions (WMOs) and a national resource management institution (BWDB), based on clear principles of good governance, mutual trust and confidence in the principles is developed and enhanced.

- By the development of effective, participatory, democratic water management institutions, local women and men become familiar with the application of the principles of good governance to their own practical situation and so become increasingly capable of exercising their rights and duties as responsible citizens.

- Through extensive leadership training and development, especially for women, knowledge and skills essential for the establishment of good governance at a local level become widely available.

However, there has been a major limitation of the 'IPSWM approach' despite its effective way in delivering the lesson learned throughout the main water institutions in Bangladesh-the BWDB. It is considered that the model is still at an early stage in terms of becoming 'standard operating procedure' in practice and would require a careful nurturing and planned propagation if it is to be extended successfully throughout the country.

5.9 CONCLUSIONS

It has been argued that the objectives enumerated in the National Water Policy are at this stage in their development the wish list of the government. They lack concrete plans and actions to translate these into reality (Iyer, 2008). Even in these new directions, experts fear

that the 'old top down engineering and structural approaches' are being pursued with a flavour of public participation, environmental concerns and institutional reforms (Iyer, 2008). Despite fundamental policy statements by the Government of Bangladesh, there are still further initiatives to be taken to implement the IWRM principles in the water sector of the country (Asian Development Bank and Water Resources Planning Organisation, 2009).

The Asian Development Bank and Water Resources Planning Organisation study entitled '*Process development for preparing and implementing integrated water resources management'* concludes with a positive note on the progress of IWRM implementation in Bangladesh (Asian Development Bank and Water Resources Planning Organisation, 2009):

> … good progress has been made at the policy and planning level towards Integrated Water Resources Management in Bangladesh. However, much remains to be done to translate policies and plans into reality on the ground through the institutions responsible for service delivery. Nevertheless, IWRM has to advance in incremental steps and the Bangladesh water-related sector is clearly moving in the right direction. (p. 44)

In respect of the water governance approach proposed in chapter 2, it could be argued that most of the elements are progressing through the water sector. However, a few elements are not as well developed as they should have been to progress IWRM principles. Administrative compartmentalization along with inefficiency is one of the fundamental weaknesses of the water institutions in Bangladesh (Asian Development Bank and Water Resources Planning Organsiation, 2009). Public participation is practiced in water resources development in the country but needs a systematic and transparent mechanism to reap the maximum benefits.

There are many legal instruments in the context of water governance which are supportive of implementing IWRM principles in the country. However, weakness in the legal regime is reflected by the slow progress of some essential legal instruments such as water act, water code and revised water planning act designed in achieving tangible progress (Asian Development Bank and Water Resources Planning Organisation, 2009). Transboundary water management is one of the fundamental issues of water governance in the country. Integrated River Basin Management (IRBM) as well as international water conventions, is seen a long term requirement for Bangladesh in tackling natural disasters and climate change along with water sustainability (Shahjahan, 2008; Takacs, 2010). Bangladesh needs special attention in the water sector to the social safety nets including alleviating poverty, mitigating arsenic contamination, tackling climate change and achieving food security in the country. Therefore, a proposed 'water governance approach' requires accommodating transboundary water management element through IRBM. A revised approach considering the inputs from the literature review of Bangladesh water sector previously provided is presented in Figure 5.10 below.

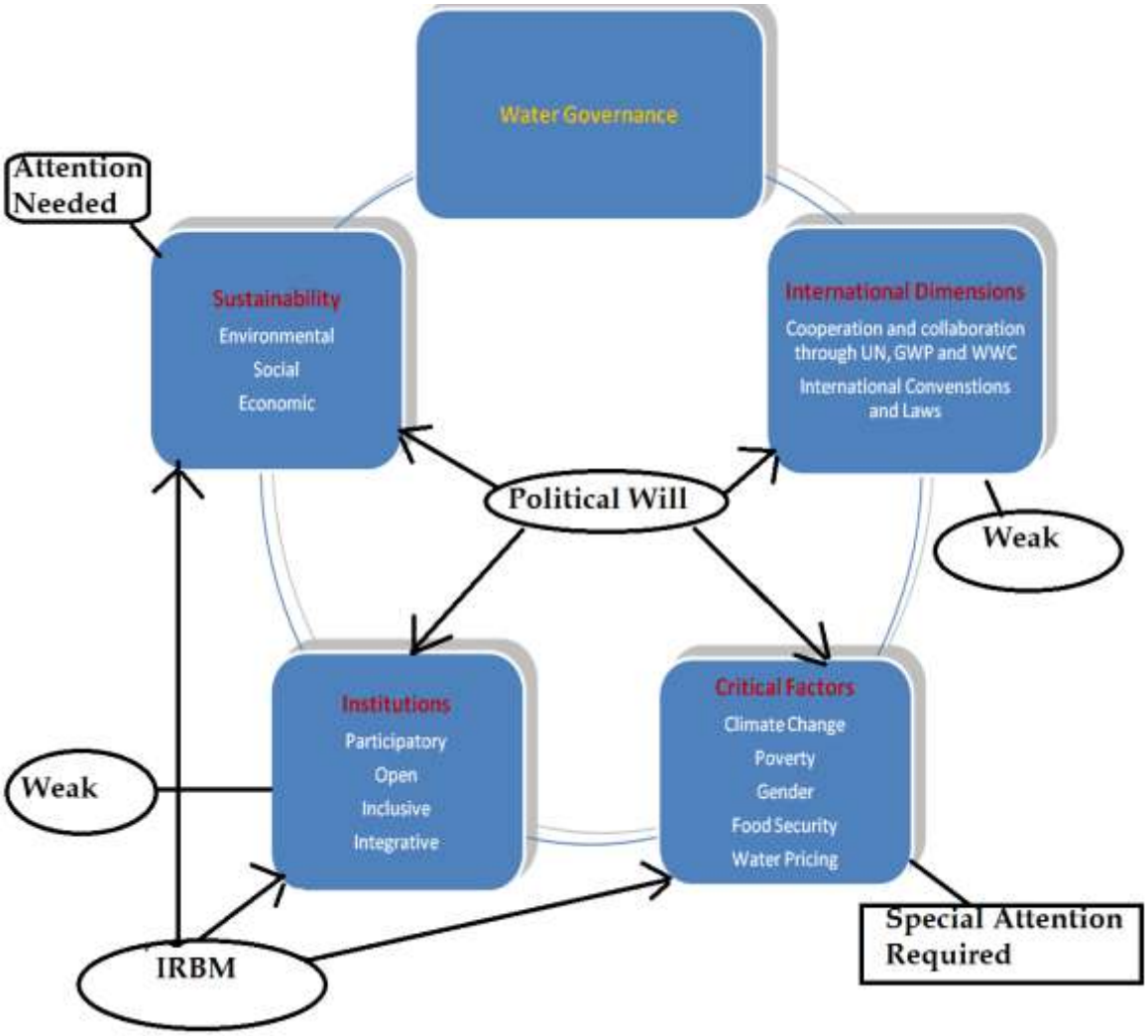

Figure 5.10. A Revised Water Governance Approach reflecting the inputs from the desk-top review of Bangladesh water sector.

The next chapter will present the synthesis of the qualitative research undertaken in Bangladesh to test the proposed water governance approach.

CHAPTER 6

SURVEY: A REFLEXIVE WATER GOVERNANCE APPROACH

6.1 INTRODUCTION

In this chapter the qualitative research findings are presented, addressing the core themes of Integration of IWRM Principles, Adaptive and Reflexive Water Institutions, and a Multi-disciplinary approach in water management.

The author acknowledges that with the small sample and the qualitative nature of the research it is not possible to attach degrees of confidence to the knowledge that is provided. That is not to suggest that this non-statistical information lacks reliability, as small scale qualitative research conducted following standard scholarly principles is well established as a basis for policy formulation. In this instance the principle purpose of the research was to provide "ground-truthing" and further refinement of the information that was obtained from the desk-top research. For this purpose, the knowledge secured is effective and is considered reliable. Further more detailed investigations would add greater precision and reliability to the data.

6.2 INTERVIEWS AND FOCUS GROUPS

The research targeted three groups for the interviews being: the policy makers and executives; water experts and researchers. Two focus groups were conducted using direct beneficiaries in the water sector of Bangladesh, one focus group comprised of officials of Water Management Association (WMA) and another focus group comprised officials of one Water Management Group (WMG).

Interview participants in the category of policy makers, water experts, and researchers for planning and management of water resources are based in Dhaka (the capital of Bangladesh) and member of the focus groups from the direct beneficiaries of the water sector are based in a project area of a water project of Bangladesh, the Integrated Planning for Sustainable Water Management (IPSWAM) *(polder* [a water region] 43/2D) in Patuakhali district of Bangladesh.

In the case study area of Bangladesh where the IPSWAM project is being implemented two focus groups were selected. The first focus group was with members of a Water Management Association (WMA) in polder 43/2D, and the second focus group was with the members of one the Water Management Groups (WMG).

Given the mixed nature of the attendees, the analysis does not attempt to draw conclusions about the generalizability of the views expressed. To do so would require different, larger scale and more statistically reliable methods of data gathering which are beyond the scope of this research. However, given the overarching research question of the thesis the choice of methods and explanation given in Chpater-3 is anticipated to be satisfactory.

6.3 DATA PRESENTATION

A pictorial presentation of the respondents is presented in Figure 6.1 on the basis of the percentage of participants of the research.

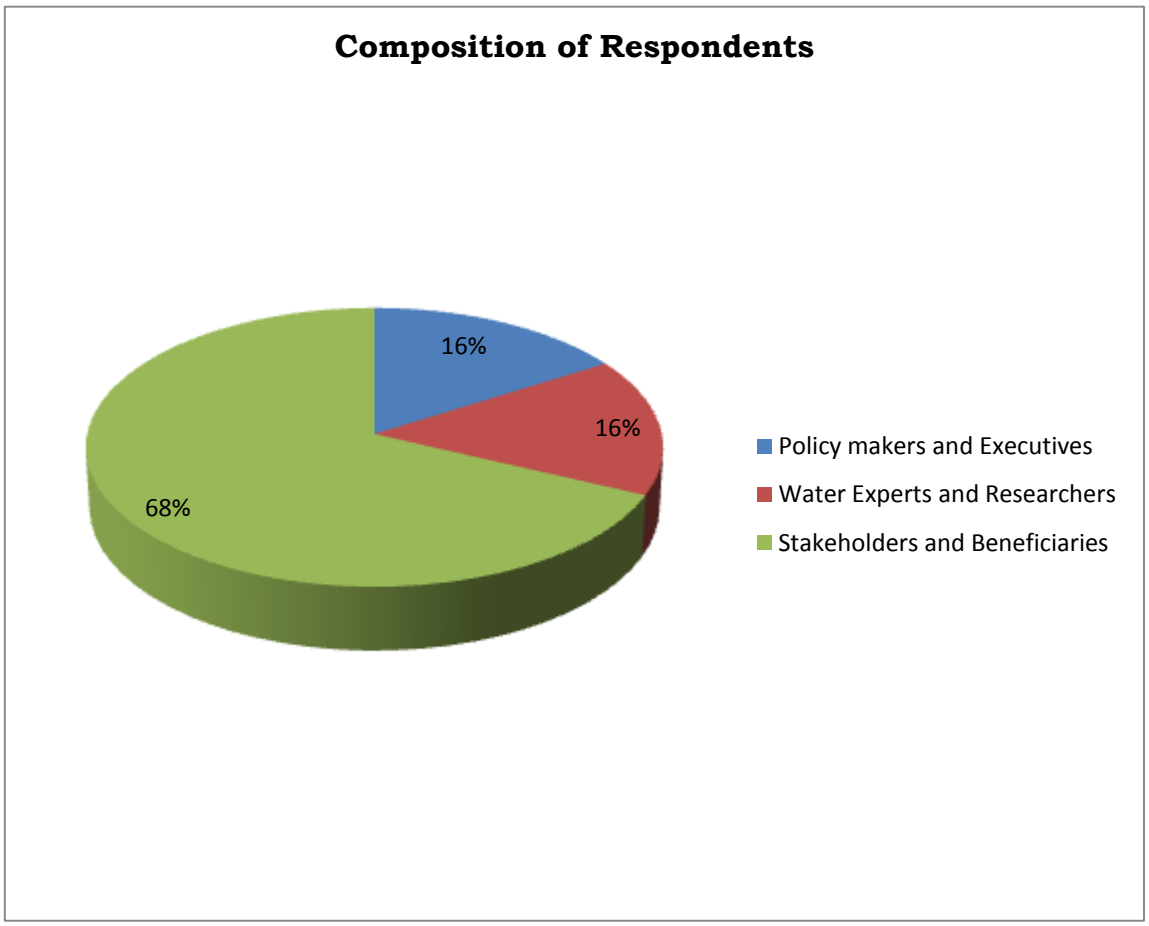

Figure 6.1: Pie-chart of the Composition of participants as a percentage in the research

6.4 ANALYSIS OF THE DATA

In this section the hypotheses are examined through semi-structured interviews and focus groups. The interviews and focus groups are analyzed against the following aspects of water governance.

6.4.1 Responses: adoption of principles of IWRM

The literature indicates that Bangladesh needs reform of its water agencies, as they function in a fragmented way. The Government of Bangladesh adopted the National Water Policy in 1999 and National Water Management Plan in 2001 (approved in 2004) where principles of IWRM have been set as the guiding principles for the water sector of the country. It is evident from the qualitative research there is a gap between rhetoric and actions in respect of implementation of IWRM (REWG 3)[1]:

> Actually IWRM has not been yet fully implemented in Bangladesh. It is being implemented. It is in a process. (RPWG2, 2010)

Since the government intention is to advance the IWRM principles in the water sector, integration will be needed dealings related to water issues. This hope is reflected by one of the participants:

> .. you cannot specifically tell that it (IWRM) has already been implemented, that the government of Bangladesh had actually given sufficient emphasis for integrated water resources management for that reason. I think over last four decades or more time involved IWRM is in the process of being implementation and the efforts are going on (RPWG3, 2010).

In the policy circles it is understood that appropriate institutionalisation is required to integrate IWRM principles in Bangladesh. This aspiration is manifested by the expectation from another participant that:

> .. if we want to operationalize IWRM, then we need to have an integrated policy to institutionalize and in that case we need to also involve the local experts in this process, in the decision making process, in the policy making, in the planning process and only then it can be successfully implemented (REWG2, 2010).

Stakeholders at the field level feel that integration is the key to successfully progress the IWRM principles as this leads to efficient and sustainable water management. One of the participants at the project area of the IPSWAM expressed that the Water Management Committee (WMA) is ensuring the integration of agriculture, fisheries, navigational use and other household usage of water by the residents of the area. Since the beginning of the project, due to greater integration, water is being prudently used (RPWG2, 2010). Another participant expressed concern about integration and suggests the way forward to achieve that:

[1] An information page has been provided for the codes, such as this one REW 3 as Appendix V- Respondents of the Survey .

> ..we have to think in an integrated way, so far all the institutions have devised many mechanisms to make these changes, but they have been all fragmented, and also we were discussing that it has to be integrated from the very conceptual stage, if you want to operationalize IWRM, then we need to have an integrated policy to institutionalize and in that case we need to also involve the local experts in this process, in the decision making process, in the policy making, in the planning process and only then it can be successfully implemented (REWG2, 2010).

It is indicated from the qualitative research that full integration of IWRM principles have not been achieved in Bangladesh. Partial implementation and progress is being made, which might lead to further integration of the principles of IWRM. Full integration would ensure effective and efficient water management in the country (Kidd and Shaw, 2007 However, the integration of IWRM would be challenge countries like Bangladesh (McDonnell, 2008).

6.4.2 Role of Institutional arrangements

Institutions play a significant role in progressing or inhibiting IWRM principles. Crase and Gandhi (2009) argue that it is essential to examine the 'past weaknesses' and explore innovations for institutions, which can help to deliver 'socially acceptable, efficient, equitable and sustainable uses of water'. During the interviews it transpired that people at both the policy level and the field level (including the stakeholders of the water management) felt that the appropriate institutional settings are crucial to consolidate the principles of IWRM in Bangladesh. One of the participants expressed that institutionalisation of IWRM will not come from the government but from the donor community:

> ..operationalizing of IWRM has not been successful in many organisations, public sector agencies in Bangladesh. Because of many reasons, first of all, because it was institutionalised or attempted to be institutionalised because of external pressure, or because it was mostly donor driven rather (REWG2, 2010).

It is encouraging to note that the tradition of reliance upon foreign consultants for the water sector is reversing, as institutions could be strengthened through the local resources, particularly by local experts and engineers (RPWG1, 2010).

One of the participants expressed that political commitment is essential to progress water governance and an appropriate mechanism should be in place to involve the politicians:

> ...we need to make sure political will is there to this governance, for a good governance, and we have to involve the politicians very closely to that and with a very good understanding....there is a lack of knowledge and understanding of IWRM among the politicians or the decision makers who would make things happen. I think we need to devise something to involve them also to help them'. (REWG2, 2010)

To advance a desired outcome from water institutions local government bodies should be involved in water governance (REWG2, 2010). This is particularly the scenario in the context of local water institutions such as Water Management Cooperative Associations (WMA):

> WMA did not work efficiently. Part of the reason is because there is no direct representation of the *local government* (REWG2, 2010)

However the need for institutional reform in the water sector was recognised:

> ... we want to change the management of water in the country to have benefits of IWRM to the doorsteps of common people-farmers, fishermen, all stakeholders in outlying areas of the country. We are changing the management, having reforms. BWDB is implementing IWRM (RPWG2, 2010).

Another participant suggests that Bangladesh water institutions need capacity building and in that direction the Government of Bangladesh has taken initiatives with support from the Government of Netherlands to strengthen the capacity of BWDB (REWG3, 2010).

It is evident that institutions play a crucial role in achieving effective water governance to implement IWRM in Bangladesh. Therefore, existing institutions may be further reformed to realize this objective with special emphasis to *strengthen local government institutions* so that water projects at the local level can deliver desired outcomes (UNESCO, 2009). A summary of the findings from this survey through qualitative research is presented in Table 6.1.

Table 6.1: Status of elements of IWRM in Bangladesh tested through qualitative research

Characteristics of IWRM	Survey or focus group participants views		
	Policymakers and executives	**Experts & researchers**	**Stakeholders/beneficiaries**
Integration	Not yet done	Not yet done	Not yet done
Participation	Started	Started and needs to be further refinement	Started
Adaptive Management	Useful approach to follow	Water sector would be benefited	Not familiar with the approach
Equity	Matter is considered	Due importance required	Hope to see the real implementation
Social Sustainability	Matter is considered	Matter is ignored	Beginning of the matter
Gender inclusion	Necessary initiatives have been taken	Further initiatives should be taken	Matter is being considered
Economic Efficiency	Actively consider the matter for future sustainability	Long way to implement this as people are poor and not willing	Appreciate the need but also fear of burden
Environmental Sustainability	Matter is being actively considered	Matter is pursued but further streamlining is required	Ready to abide by the environmental guidelines
Pro-poor water policy (poverty reduction)	Government claims for this	Still appropriate linkages should be established	They expect immediate action and continuation of that for a period
Full Water pricing	Government has introduced this	Private agency can, still public sector has to subsidise many people have no capacity to pay the water price	They favour best utilisation of water where pricing is a tool, but they are apprehensive of high prices . They favour gradual shifting.
Food Security	In policy framework matter is incorporated	This is serious matter and there should be enough measures to ensure this.	People are willing to help government to achieve this
Climate Change	Government has taken necessary initiatives, such NA	Further initiatives should be taken.	They feel concerned and are willing to help tackling the matter with water bureaucrats

Characteristics of IWRM	Survey or focus group participants views		
	Policymakers and executives	**Experts & researchers**	**Stakeholders/beneficiaries**
Integrated River Basin Management (IRBM)	Sees benefit but cooperation with India is the main focus now	IRBM should be given due consideration, even through SAARC this matter could be pursued further.	Not familiar with the matter
International Convention and cooperation	Government actively hope to sign cooperation agreements with India	Further persuasion is required	They do not bother about the issue
Water Laws	Water code is under consideration	Necessary legislation should have been in place long ago	Necessary laws should be there

Source: Compiled from the interviews by the author (2010).

6.5 FEEDBACK ON THE PROPOSED GOVERNANCE APPROACH

In delivering IWRM principles there are many factors, which are interlinked with the issue and are important in devising a policy framework for water management. Among those important factors are the issues of: food security; participation; climate change; water pricing, gender and international cooperation which are presented on the basis of feedback received from the participants at the policy and field levels.

6.5.1 Food Security

Bangladesh, traditionally blessed with a fertile land and rich water resources, is dependent on agricultural production. In recent years the contribution of agriculture to the national economy has been significantly reduced to around 22 percent (BBS, 2007) but still this sector plays a crucial role in providing food security as well as providing employment (REWG1, 2010). To meet this challenge of food supply for the growing population at about 150 million (BBS, 2009) and the reduced supply of water due to low rainfall and drought it is essential to have better irrigation and water management in the country (Lenton and Muller, 2009 a). Participants supported the need for better irrigation and water management as food security and water management are intertwined, particularly putting in place IWRM principles:

> We need water governance for food self sufficiency, food autarky, ours is the most densely populated country (RPWG2, REWG1, RPWG3, RFWG2, 2010).
>
> .. our food security is linked with successful implementation of IWRM (RPWG2, REWG1, RPWG3, RFWG2, 2010).

6.5.2 Participation

In Chapter 2 it is argued that to satisfy IWRM principles there should be a proper structure for public participation (European Union, 2001). Berry and Mollard (2010, p. 309) define two types of participation in the context of social participation in water management as:

> Participation *strict sensu*, meaning formal dialogue generally framed by *regulation* or policy, and participation *sensu lato*, meaning the embeddedness of participatory stages within political struggles. (Berry and Mollard, 2010).

The Government of Bangladesh has emphasised participation, *strict sensu* as indicated above, which is reflected in the promulgation of the Guidelines for Participatory Water Management in 2001 (GOB, 2001). One participant expressed ideas for participation in the water sector as:

> .. IWRM should not be an imposed kind of management plan; that will not bring any success, so to make it sustainable we are going to have actually formalised participatory water management groups, all the major water controls/stakes here irrigation schemes, in different water projects (RPWG2, 2010).

Stakeholders' participation was considered (RPWG4, 2010):

> ..the Government of Bangladesh by now has adopted the National Water Policy, and following this National Water Management Plan has been prepared. And since the IWRM has newly been incorporated and new in the people's participation or stakeholders' participation. Those people are incorporated those who are benefitted, or affected or influenced by the water resources in the country. With this component inclusion in the National Water Policy, our working dimension has got some changes, and after the adoption of the NWPo in 1999, and introduction of the Guidelines, Bangladesh Water Development Board as the major agency of implementation of water resources projects, taken up a project named Integrated Planning for Sustainable Water Management (IPSWAM), the project started to work in the southern part of the country, in the Barisal and Khulna region, the project was designed direct implementation of policy in the ground level (RPWG4, 2010).

It is acknowledged that the first form of participation (*stricto sensu*) is being introduced in water projects in Bangladesh (RPWG, 2010):

> ...they (BWDB) have changed and also we are going to implement participatory water management concept in taking into fold all stakeholders and interest groups involved in IWRM (RPWG2, 2010).

Planning and development of water resources in an entire country requires all stakeholders to be consulted (RPWG2, 2010):

> Water management is not an engineering issue only, farmers, irrigators and common people all should be linked in water management (RPWG2, 2010).

Given the advent of participatory planning processes in development activities, it is evident from the qualitative research that a *sensu lato* participatory approach in the water sector could be introduced in Bangladesh. Though there is considerable criticism about 'real participation' (Chambers, 1997), it is expected that the practice of public participation can help the country to utilize its water resources wisely to translate the principles of IWRM for the benefit of ordinary people (Daniell, 2011; Byron, 2011).

6.5.3 Climate change

Climate change is an emerging threat to the natural resources of the country and the water sector in particular would be the most affected area. During the interview process almost all participants agree that the climate change issue has implications for the water sector and that it is necessary to tackle this menace with prudent and effective water governance (RPWG2, 2010). Climate change is an important matter in dealing with the water resources management (RPWG2, 2010):

> ...whatever hazards occurred in Bangladesh mostly related to water, we have cyclones, tidal surges all related to water, so we have to have policies considering climate change, now climate change issue is a big issue in Bangladesh, we are not the polluters but the victim of that (RPWG2, 2010).

Another participant also expressed that climate change is a serious matter for Bangladesh and the water sector is vulnerable (RPWG3, 2010):

> Bangladesh is such a place, where actually people are vulnerable to climate change impacts (RPWG3, 2010).

One of the participants explained that due to climate change Bangladesh may expect two types of impacts on water resources. On one hand there would be frequent floods due to sea level rise and on the other hand there will be drought due to erratic rainfall (RPWG4, 2010). There is hope that it is within the reach of Bangladesh to face part of this challenge with raising the height of the embankments in the coastal area.

This fact of impact of climate change on water resources is also similarly highlighted by another participant, discussing the severity of the climate change impacts on water resources (REWG2, 2010):

> ...water sector is the most vulnerable sector to climate change, to climate change impacts. First of all, because of natural disasters, mostly water related disasters, and because of this increased severity and frequency of these, Bangladesh will become more vulnerable in water sectors (REWG2, 2010).

It is also suggested that Bangladesh may try to mitigate and adapt the situation. However, there is emphasis on the need for international support and cooperation to this endeavour (RPWG3, 2010).

It is well known that Bangladesh is a country which faces frequent floods and cyclones almost every year. It is also acclaimed internationally that Bangladesh has a reputation for disaster management as the country has a very standard operating system (SOP) in this regard. It is hoped that despite increasing threat from climate change and natural disasters Bangladesh will be able to save lives of human beings as well as livestock through constructing more shelters at the coastal zones with international support (RPWG4, 2010).

Given the increasing threat of climate change, water resources of the country are vulnerable. Climate change and water sustainability are interlinked issues in the context of the environment, economy and society of Bangladesh. According to scientific analysis of the Intergovernmental Panel on Climate Change (IPCC), if the sea level rises by almost 53 centimetres by 2050, 13 % of the population of Bangladesh would suffer from inundating water (Bates et al., 2008). Therefore adaptation in managing water resources would be vital for Bangladesh in the face of climate change. Institutional reform in the water sector, enacting further legislation to use water wisely and building an adaptive strategy to implement IWRM in dealing and coping with climate change would be crucial for developing countries like Bangladesh (Jarraud, 2008; Global Water Partnership, 2009).

6.5.4 Water Pricing

In Chapter 2 it has been argued that successful implementation of IWRM depends probably on effective water pricing (Cap-Net and UNDP, 2008). Iyer (2008) argues that due to the emergence of a new economic reality where water is considered increasingly an economic good, water pricing is an important element in delivering efficient water management. Given the context it may be difficult to use water pricing mechanisms in Bangladesh (Iyer, 2008). All participants (RPWG1, RPWG2, RPWG3, RPWG4, 2010) in the qualitative research agreed to the need for an effective water pricing mechanism. However, they (RPWG1, RPWG2, RPWG3, RPWG4, 2010) advised a gradual move towards more objective water pricing given the socio-economic condition of the users of water. One participant stated that water pricing could be introduced at a later stage (RPWG4, 2010):

> Water pricing is difficult considering the situation of the country, in some irrigation projects, there are some provisions of service charge but it is not satisfactory, so probably pricing of the water could be thought of later on (RPWG4, 2010).

The same concern about using water pricing to enable effective management was also expressed (RPWG2, 2010):

> Right now, we are not doing that (water pricing), our farmers are poor, but water is a commodity, it should be paid for. Right now we are cautious but we are trying to introduce irrigation service charge. For extraction of water, somebody has to pay for that (RPWG2, 2010).

Another participant also acknowledged the importance of water pricing (RPWG3, 2010):

> one important thing is that, this is also ingredient in your water governance (approach), water pricing (RPWG3, 2010).

A strategy to introduce water pricing with proper campaigning and building awareness through a consultative mechanism was also suggested (RPWG3, 2010):

> ... let there be a mechanism (consultative) we can collect it properly, without any misunderstanding, without wasting huge time, say without displeasing the farmers. (RPWG3, 2010)

It is evident that water pricing is important in managing water resources in the country even in the face of stakeholder resistance. However, future development and management of water resources for its sustainability requires the issue of water pricing to be considered (Cap-Net and UNDP, 2008).

6.5.5 Gender

Gender is an important element in water management, recognised in the Dublin Principles. In the context of delivering IWRM principles in a country like Bangladesh, the issue of gender

should be carefully considered. In the qualitative research feedback clearly manifests that gender is considered in Bangladesh as one of the important aspects in achieving success in the water sector. Almost all participants at policy and research level agree that the issue is an important element in water governance (RPWG1, RPWG2, RPWG3, RPWG4, REWG1, REWG2, REWG3, 2010). Whether appropriate weight is given to this in the water sector is not clear. One of the participants expressed a less than encouraging picture on the issue (REWG2, 2010):

> This is still, I believe, a debate in the water sector although we are saying that gender is an important consideration in water governance, or water management, we are saying this but this is not really happening, in practice there is a gap (REWG2, 2010).

It is a good sign for Bangladesh towards gender inclusiveness in the water sector that both the National Water Policy and National Water Management Plan recognise the importance of gender and appropriate measures are suggested to achieve that. This sentiment was also reflected by one of the participants (RPWG2, 2010):

> Of course we are very sensitive about gender, Bangladesh is a unique LDC (Least Developed Country) having successively two prime Ministers who have been ladies, so automatically gender has been taken care of in Bangladesh, in implementing any development activity, we should make sure 50 percent of population who are female their full participation (RPWG2, 2010).

Whilst at the senior level it is felt that the gender issue is taken care of, it is also heartening to find that at the grass root level gender is considered as an important element in the decision making process. During the qualitative research at the field level, one of the participants reported experiences in dealing with members of WMA where there are female members are included. At the village level there was opposition to the female members but since the participant had significant cultural standing in the village he could convince the people of the locality that the gender issue was important and thereby was able to encourage consideration of gender equity in water governance. This type of social dimension is positive for improvement of the water sector as women are essential to achieve targets in respect of water and sanitation of the MDGs (Lenton and Muller, 2009 b).

From the research the gender issue is an essential aspect for water governance in Bangladesh. It is also evident from the qualitative research that gender plays a critical role in managing water resources though sufficient methods for management are yet to be fully applied. It is needless to say that the future management of water resources for sustainability would require gender mainstreaming (Renwick and Joshi, 2009)

6.5.6 Water laws, international conventions and international cooperation

It has been argued earlier that effective water law is essential to sustainable water management in a country (Olleta, 2010). Many respondents in the survey express the same view (RPWG1, 2010; RPWG3, 2010; REWG2, 2010). The Government of Bangladesh has drafted a National Water Code, which will be implemented soon. It is expected that this Water Act will provide a legal framework to further improve the institutional aspect of water

management (Asian Development Bank [ADB] and Water Resources Planning Organisation [WARPO], 2009).

Barlow (2007) argues the need for international cooperation for water management, claiming that '215 major rivers and 300 ground water basins and aquifers are shared by two or more countries' which leads to occasional confrontation over water resources. Barlow (2007) cites many international disputes between and among countries on the same basin system, including between Bangladesh and India, over the Ganges river as regular flooding causes the havoc in Bangladesh.

On the political level, this issue of immediate need for international cooperation is recognised (RPWG1, 2010):

> International cooperation is the first and foremost work for our national policy, particularly in the context of water management, as we are lower riparian country (RPWG1, 2010).

Regional cooperation in water management comprising India, Nepal, Bhutan and Bangladesh is stressed. Bangladesh is a lower riparian country where those countries in the region are important to meaningful cooperation (RPWG1, 2010; REWG1, 2010). Another participant also suggested that international conventions should be in place to efficiently use the water resources (RPWG2, 2010):

> Right now existing international laws and conventions are not good enough to help Bangladesh as a lower riparian country. We think that this kind of laws which are not binding upon anybody, we have conventions on non navigational uses of water, it has been signed by around 20 countries, but to make it effective 33 countries have to ratify that. There are some provisions, which are not helpful for Bangladesh, those need to be carefully scrutinised (RPWG2, 2010).

In respect of international cooperation, given the context of neighbouring countries many participants (REWG1, REWG2, RPWG3, 2010) felt that there should be regional cooperation framework such as Integrated River Basin Management (IRBM). One participant expresses (RPWG2, 2010):

> Of course, river is an entity, which cannot be divided with its borders. River is an entity it should be maintained from source to the sea, problems with neighbouring countries in respect of sharing the water; of course basin wide management is the answer. To strengthen regional cooperation we need a framework to retain that (RPWG2, 2010)

Another participant expressed that Bangladesh could tackle many social, economic and environmental issues if regional cooperation in water resources could be developed. Areas of opportunity include energy demand mitigation through generating hydroelectricity, poverty reduction and eco-system management (REWG1, 2010). One participant expressed the same idea with a special reference to the SAARC (South Asian Association for Regional Cooperation) process and SADAC (South African Development and Economic Cooperation) (REWG2, 2010):

> So collaborations have to be basin wide. And water management have to be basin wide, for that we need the regional collaboration, cooperation (*Integrated river basin management*), yes, exactly, there are many examples in the world, like Indus basin, Mekong river basin, so why can't we have that. This is again a political question, in the regional context; SAARC could play an important role in this context (REWG2, 2010).

It is evident from the interview that international cooperation and laws and conventions are important for Bangladesh to effectively and efficiently managing water resources to translate the principles of IWRM (Fisher and Cook, 2010).

6.5.7 Usefulness of a multi-disciplinary approach in achieving IWRM principles

That water management issue is a multidimensional issue as it has been argued by many water experts (Biswas et al., 2005).

In the case of the Bangladesh water sector, the participants agree that the issue is a multidimensional (RPWG4, REWG3, RFWG1, 2010). One of the participants expresses this sentiment (RPWG4, 2010):

> In water management multidimensional approach has been given more priority, participation has been given more priority, also with gender sensitivity, all these things are being incorporated in the planning process (RPWG4, 2010).

Many participants feel that in the case of water management in Bangladesh, a multi-disciplinary approach has not been given due importance, as still there is a lack of coordination among different agencies of the government who are managing the water sector (REWG2, 2010; RPWG4; REWG1, 2010). To adopt IWRM principles with a multidisciplinary approach, it is essential to have a political commitment. One of the respondents argues that whatever good elements are there for devising'good water governance' there must be '*political will'* to implement this (REWG2, 2010).

6.6 CONCLUDING REMARKS

Integration is one of the important aspects of IWRM principles. In the case of Bangladesh it has been observed that at the policy, expert and stakeholder levels integration has not been in place for effective implementation of IWRM principles. Public participation is operational in the water sector, however there still are more action to be taken for 'effective participation' of all stakeholders in the development and management of water resources. An 'adaptive management' approach is familiar at the policy and expert level but the term is not familiar at the field level to the beneficiaries. The equity issue is considered in water planning and management at the policy level but at the expert level enough measures have not been in place. Participants at the beneficiary level expect 'real implementation' of the equity aspect in water management.

Social sustainability and gender inclusion are two important aspects in the water sector. Social sustainability and gender inclusiveness in the water sector are expected to lead to a

'right direction' towards efficient water governance in the country. Economic efficiency of the water management is being considered by policy makers in Bangladesh. However, the experts feel that it would be difficult to implement rational pricing in the near future as the people are poor and not willing to pay the 'economic price' of the water. The beneficiary level participants are also apprehensive about an introduced price mechanism for water services, particularly for irrigation. Private services development for water could be another option for efficient water management, which gradually might be developed in consultation with stakeholders in the country.

The Government of Bangladesh expects initiatives to have a trickledown effect on poverty, identified by the policy level participants (RPWG1, RPWG2, RPWG3, RPWG4, 2010). Experts felt that a 'pro-poor' water policy should have been developed. The stakeholders at the grass roots level also feel that the government should take a pro-poor water policy approach to the continuation of the current services.

Integrated river basin management (IRBM) across national boundaries is one of the main issues in respect of IWRM principles to be implemented in Bangladesh. Policy and expert level participants are aware and feel that IRBM depends on the 'goodwill' of the neighbouring countries of Bangladesh, particularly India-being the upper riparian country from where around 54 rivers are flowing into Bangladesh. International laws and conventions are also important for Bangladesh in managing water. This is reflected by the responses from policy makers and experts whereas the respondents at field level are not aware of the relevance of these. It is expected that full enactment of the draft *Water Act 2012* would provide a positive impact on the water governance in the country.

There is a need for due attention towards strong integration of different factors which are essential for achieving effective water governance to overcome weak integration. Local Government Intuitions can play a significant role in delivering effective and efficient water governance in countries like Bangladesh where Local Government Institutions are traditionally weak.

A revised water governance approach mapping water governance of Bangladesh which is also a critique of water sector is presented in Figure 6.1 below after incorporating the feedback received from the survey as described above.

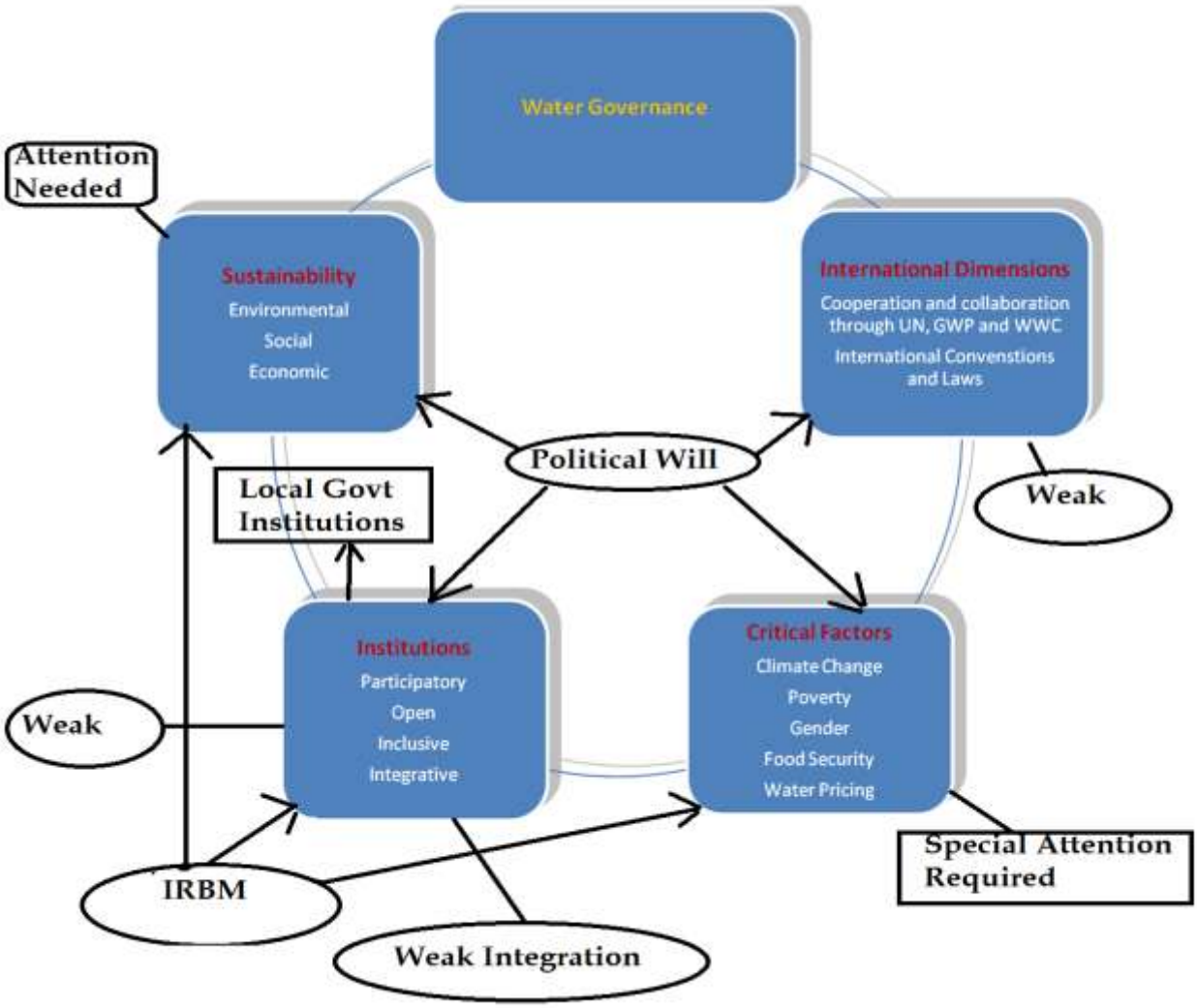

Figure 6.1: Revised water governance approach incorporating feedback from the survey.

In the next final chapter conclusions with a summary of the thesis and recommendations for future studies are presented.

CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 INTRODUCTION

Water sustainability in countries like Bangladesh is a crucial issue in the face of the emerging threat of climate change. Prudent and wise development and management of water resources is imperative to attain sustainability, self sufficiency in food, reducing poverty, attaining MDGs, tackling disasters like flooding and droughts and facing the grim reality of the emerging menace of climate change. This thesis examines whether a reflexive water governance can deliver IWRM principles in the country using a multi - method approach including literature reviews; a case study, semi-structured interviews and focus groups.

The literature reviews demonstrate that the concepts, rhetoric, politics and application of IWRM in water management have implications in tackling poverty, gender and sustainability aspects of a particular country. It has been shown that IWRM outcomes can contribute towards achieving the targets of MDGs. The thesis examines the leverage of international organisations such as the UN, WWC and GWP in implementation of IWRM principles in different countries, particularly in the developing countries like Bangladesh. The qualitative research demonstrates necessity of integration of IWRM principles which has been partially implemented in Bangladesh.

The study indicates that Bangladesh could benefit through the adoption of the element of a water resources development and management strategy.Pursuing a reflexive and adaptive water governance structure for IWRM using a reflexive and adaptive governance framework.

It is expected that this strategy would help to tackle the impact on water resources due to climate change in countries like Bangladesh.

7.2 THESIS SUMMARY

IWRM principles have existed for the last several decades. Over the period some changes in the management approach towards vital natural resources like water have witnessed. International groups like the Global Water Partnership (GWP) have been professing the IWRM processes as an integrative perspective for water management that is responsive to economic, environmental and community outcomes. Some progress has been achieved in terms of reflexivity in the governance of water resources in countries around the world, in terms of a real adaptive management approach to operationalize the concept. This thesis set out to articulate a reflexive governance approach structure for water management using a learning-oriented adaptive management process through which to advance the IWRM agenda. This was attempted to gather some opinions with a small sample through semi-structured interviews, focus groups and literature reviews. Semi-structured interviews were conducted primarily at the policy making level and focus groups were conducted at a study area (IPSAWM/*Polder*[a water area] 43/2D) where the strategy to manage the water resources was set in accordance with the 'principles of IWRM' under the BWDB according to their stated policy.

In Chapter 1, the thesis set out the research design processes in a systematic manner and set the tone for the various investigative methods to be pursued in subsequent chapters, aimed at addressing the overall aim of the thesis as indicated in Section 1.3.

Chapter 2 shows that IWRM is a continuous process, which has evolved over time. Implementation of IWRM depends on the community or the country concerned. It transpires that IWRM is also a political process, which has social, economic and environmental implications. The literature review demonstrates that water governance needs a matrix of political, social, economic and administrative systems. It is argued in this chapter that effective water governance requires building institutional linkages with improved accountability and transparency. Experts observe that environmental, social and economic sustainability of water resources is crucial in achieving MDGs, food security and tackling climate change. The chapter reflects the need of reflexive water governance which can deliver IWRM principles to attain these developmental targets. The chapter highlights the significance of the role played by the United Nations and other international bodies in effective planning and efficient management of water resources. The international dimension must be considered for designing effective water governance systems to deliver IWRM principles. Global cooperation through international agencies is urgently needed given climate change impacts on water resources. In this chapter a reflexive water governance approach was proposed.. The approach contains four main components – sustainability, institutions, critical factors and international dimensions. All critical issues related to water resources fall under these four main components. It has been argued in this chapter that for achieving IWRM, all these elements are vital and these four main components are also interconnected, meaning that each factor depends on the other factors.

Chapter 3 outlines the methods used to evaluate the approach of water governance in Bangladesh and to determine how IWRM principles could be implemented in the country. Semi structured interviews and focus groups of the people making and executing water policy and the direct beneficiaries of water policy give a clear idea of how the IWRM principles could be implemented with a reflexive structure of water governance.

An ideal process would have been to conduct in-depth surveys of all the water institutions and stakeholders of water issues. Due to limitations of time and other resources, the current study conducted in-depth interviews with targeted people in the area of the water sector in the country and focus groups with stakeholders in the field coupled with literature reviews including policy and document analysis of the Government of Bangladesh in the water sector. This is only a concept and preliminary evaluation which needs a full test of these concepts.

In order to have a practical appreciation of the IWRM concept, the study reviewed the current state of IWRM implementation in Australia and India in Chapter 4. The chapter looks at IWRM governance structures and the processes to assess the observed practices in comparison with the conceptual approach.

The case of water governance in Australia shows a long history and advanced development in the water sector. Many of the elements proposed in the ‘water governance approach’ are reflected in water management practices in Australia. Achievement state-wide cooperation at the basin level as reflected in the federation style governance in Australia, where between the commonwealth and states and among states legal cooperation in water sharing exists.

Experiences in respect of public participation are helpful in understanding of 'public participation'. This is recognised as being present in both Australia and India though there are criticisms of the quality of participation. In the case of India, the government, civil society and NGOs pursue a participatory approach in water management. Another important element identified through the Australian experiences is that 'political will' which is essential in moving forward reform. Integrated River Basin Management as illustrated by the MDB could be useful in the case of Bangladesh, as a lower riparian country with the neighbouring country India. Australian legal history and development could be another input into the proposed approach which re-enforces the element of 'conventions and laws'. In case of water governance experiences in India vis-a-vis the proposed approach, lessons could be utilised to face the similar challenges in Bangladesh in managing water resources where India is also struggling to achieve desired developments in the areas shown in the 'water governance approach'. Australian experiences show that regional cooperation in water resources management with the Integrated River Basin Management could be useful for Bangladesh. In this chapter it has shown that in the proposed governance approach a new element of Integrated River Basin Management (IRBM) could be brought in to strengthen the water resources management in Bangladesh. In this chapter it has been shown that additional elements could be brought in the proposed 'water governance approach' from the experiences of water governance in countries like Australia and India.

In Chapter 5, the institutional and policy aspects of water management in respect of implementing IWRM in Bangladesh was investigated with extensive discussion on the existing framework of water governance. Here the consideration was how the existing water governance is affecting the status of IWRM progress in the country. This chapter confirms that the objectives enumerated in the National Water Policy are fundamentally the wish list of the government without concrete actions to translate these into reality (Iyer 2008). The interviewed experts fear that the 'old top down engineering and structural approaches' are being pursued with only a flavour of public participation, environmental concerns and institutional reforms. Despite two fundamental policy statements, one National Water Policy of 1999 and the National Water Management Plan of 2001 (adopted in 2004) by the Government of Bangladesh, there are still further initiatives needed to implement the IWRM principles in the water sector of the country (ADB and WARPO, 2009).

The ADB and WARPO (2009) study entitled '*Process development for preparing and implementing integrated water resources management'* presents a positive picture of the progress of IWRM implementation in Bangladesh. The chapter shows that most of the elements proposed in the water governance approach in Chapter 2 are found to be progressing, however, there is weakness in integration of the IWRM principles, institutions and linkages with social, economic and environmental sustainability and water management. Administrative compartmentalization, along with inefficiency, is one of the fundamental weaknesses of the water institutions in Bangladesh (ADB and WARPO 2009). The literature suggests that public participation is practiced in water resources development in Bangladesh, but this needs a systematic and transparent mechanism to reap the maximum benefits. The chapter also shows that the legal regime is supportive of implementing IWRM principles in the country but without some key legal instruments (such as the draft *Bangladesh Water Act 2012* and revised *Water Planning Act 1992),* achieving tangible progress in the water sector will be difficult. The chapter argues that transboundary water management is one of the fundamental issues of water governance in the country. Integrated River Basin Management

(IRBM) is a long term solution for Bangladesh in tackling natural disasters and climate change along with achieving water sustainability. The chapter manifests that Bangladesh needs to pay special attention in the water sector to address social safety nets including alleviating poverty, mitigating arsenic contamination, tackling climate change and achieving food security in the country. The chapter concludes that an effective 'water governance approach' requires accommodating transboundary water management through IRBM, political will and a strengthening of local government institutions.

Chapter 6 discusses the primary research undertaken to test the proposed approach of water governance for Bangladesh reflecting the IWRM rhetoric. It is shown that integration is one of the important aspects of IWRM principles. In the case of Bangladesh at the policy, expert and stakeholders level participants stated that integration has not been in place for effective implementation of IWRM principles. Public participation is used in the water sector in the country. However, there should be more action for 'effective participation' of all stakeholders in the development and management of water resources. An 'adaptive management' approach is familiar at the policy and expert level but the approach is not familiar to the beneficiaries. Equity is considered in water planning and management at the policy level but the expert participants expressed that enough measures have not been put in place. Participants at the beneficiary level expect 'real implementation' of equity in water management. This chapter also validates the view that social sustainability and gender inclusion are two important aspects in water governance which are important in Bangladesh. Social sustainability and gender inclusiveness towards efficient water governance in the country.

Economic efficiency of the water management is being considered by policy makers in Bangladesh. The experts identify that it would be difficult in the near future as the people are poor and not willing to pay the 'economic price' of the water. At the beneficiary level, there is apprehension about an introduced price mechanism for water services, particularly for irrigation services.

Environmental sustainability of water is a crucial matter for Bangladesh, particularly in the context of tackling climate change.

The Government of Bangladesh has taken initiatives for water management intended to have a trickledown effect on poverty, highlighted by the policy level participants however experts feel that a 'pro-poor' water policy should have been developed. The participants at grass roots level highlight that the government should take a pro-poor water policy including continuation of the current services. The chapter shows that there is a direct linkage of prudent water management and food security in the country.

Chapter 6 explains that Integrated River Basin Management (IRBM) is one of the main challenges in respect of IWRM principles in Bangladesh, as it is a lower riparian country in the region. Policy and expert level participants are aware that IRBM depends on the 'goodwill' of the neighbouring countries of Bangladesh, particularly India from where around 54 rivers are flowing into Bangladesh. The chapter concludes that international laws and conventions are important for Bangladesh in managing water, notably highlighted by the responses from policy makers and experts. This chapter highlights the importance of enacting necessary water laws including the draft *Water Act 2012.* At the end of the Chapter a revised water governance approach is presented after inclusion of inputs as described.

Chapter 7 concludes the thesis confirming need for a reflexive and adaptive water governance approach to achieve IWRM principles in countries like Bangladesh for water sustainability. The qualitative research shows that the proposed water governance approach is widely acknowledged as an appropriate 'reflexive water governance structure' for Bangladesh. The chapter also recommends a few additional elements which are needed to be incorporated. These elements are 'Political Will', 'Integrated River Basin Management (IRBM)' and 'Local Government Institutions' on the basis of previous chapters. The chapter concludes that this re-worked and revised approach as given in the Figure 7.1 would be helpful for many countries including Bangladesh to examine the viability of the revised water governance approach for the water sector to have the leverage in achieving the target of implementing IWRM principles in the respective country. The chapter also provides an outline of the possible contribution of the research findings in Bangladesh and puts forward suggestions for future research.

7.3 REVISITING THE RESEARCH QUESTION AND HYPOTHESES

This research investigates whether 'reflexive governance' can deliver IWRM outcomes in Bangladesh. To find out the answer of this quest, four hypotheses were put forward for investigation in Chapter 1. The results of testing these hypotheses through this study are presented below:

Hypothesis 1: The principles of IWRM have not been adopted or integrated in the water sector of Bangladesh.

It is found that in the water sector of Bangladesh the principles of IWRM have been adopted in the policy and programmes statement and strategy. However, full integration of that rhetoric has not been done; only partial integration has been attempted. In their book *Integrated Water Resources Management in South and South East Asia*, Biswas et al. (2005, p. 7) assessed the status of the implementation of the IWRM concept in eight countries including Bangladesh and they concluded that effective water institutions are required to implement the principles. In the thesis a 'reflexive water governance approach' has been proposed which contains four main components – sustainability, institutions, critical factors and international dimensions. It is also transpired from the current study that full integration would ensure effective and efficient water management in the country

Hypothesis 2: The current institutional arrangements of the water sector in Bangladesh are a barrier to achieving IWRM outcomes.

It is found that many of the institutional arrangements are not adequate to take forward the IWRM principles. There are still 'turf wars' between different government agencies dealing with water issues. However, it is encouraging that the main agencies in charge of the water sector management, such as BWDB and LGED are leaning towards further reform to work better to deliver the IWRM principles. It is widely acknowledged that institutions can play a significant and crucial role in achieving effective water governance to implement IWRM in Bangladesh. The study suggests that the existing institutions may be further reformed to

realize this objective with special emphasis to strengthen local government institutions so that water projects at the local level can deliver desired outcomes.

Hypothesis 3: A reflexive governance approach can deliver IWRM outcomes in the Bangladesh water sector.

It has been established that a reflexive and adaptive water governance framework can certainly deliver better results to implement IWRM principles. The current thesis shows that adaptation and reflexivity in managing water resources would be vital for Bangladesh in the face of climate change. Institutional reform in the water sector, enacting further legislation to use the water wisely and building an adaptive strategy to implement IWRM in dealing and coping with the climate change would be crucial for developing countries like Bangladesh.

Hypothesis 4: Managing change to achieve IWRM outcomes requires a multi-disciplinary approach.

The water sector needs a multi-disciplinary approach to better deal with the very complex and dynamic issue which can ensure food security, safe water and sanitation, alleviate poverty, mainstream gender and bring a resolution to water conflicts within a regional framework. IWRM and food security are interlinked in the context of Bangladesh where effective water governance is essential to achieve food security in the long run. The qualitative research shows that the participatory approach in water management in the country is an initial stage and it is expected that this practice of public participation can help the country to utilize its water resources wisely to translate the principles of IWRM for the benefit of ordinary people.

The qualitative research findings show that future development and management of water resources for its sustainability requires the issue of water pricing to be considered. The study finds positive correlation with future development and management of water resources for its sustainability and gender mainstreaming in the water sector. The qualitative research also clearly recognizes the need for international cooperation and laws and conventions which are not only useful but also essential for Bangladesh to effectively and efficiently manage water resources to translate the principles of IWRM. The qualitative research finds justification in translating IWRM principles with a multidisciplinary approach which requires a strong political commitment.

After analyzing the qualitative research it appears that the proposed water governance approach is widely acknowledged as an appropriate ‘reflexive water governance structure’ for Bangladesh. However, a few additional elements need to be incorporated. These elements are ‘Political Will’, ‘Integrated River Basin Management (IRBM)’ and ‘Local Government Institutions’.

To deliver effective water governance in addition to integration, coordination, participatory approach, a multidimensional approach is required where different disciplines such as hydrology, engineering, law, economics, political sciences etc can play a significant role. This multidisciplinary approach could play an effective role in delivering good water governance.

7.4 CONTRIBUTION OF THE RESEARCH FINDINGS

Water institutions in Bangladesh needs to be reformed in line with the emerging issues related to the efficient planning, development and management of water resources including in line with the IWRM principles. Following two aspects could be applied in Bangladesh as per the findings of the current research.

The research validates that participatory approach of water governance is required. In cases of Australia and India as well as from the field survey in Bangladesh it manifests that for implementation of IWRM principles a 'real participatory' water governance approach is required. The water sector in Bangladesh can embrace this aspect without much difficulty as there has been a practice of 'participatory water management' approach as per the Guidelines of the water Resources Management in the country. It needs a change in the 'mental models' of the water bureaucrats in the country.

Effective water legislation can help countries in managing the water resources as manifested by the literature review on water governance in Australia and India. Bangladesh has numerous legislations related to water resources but enactment of a comprehensive *Water Act* would help the country to efficient management of water resources.

Apart from those two applied contribution to the water sector in Bangladesh, the current research also finds that other aspects of issues are interlinked with efficient water governance and water sustainability, livelihoods, food security and poverty reduction. These are development of Integrated River Basin Management including development of international conventions on water uses, water pricing including private participation in water supply, political maturity and strengthening of local government intuitions.

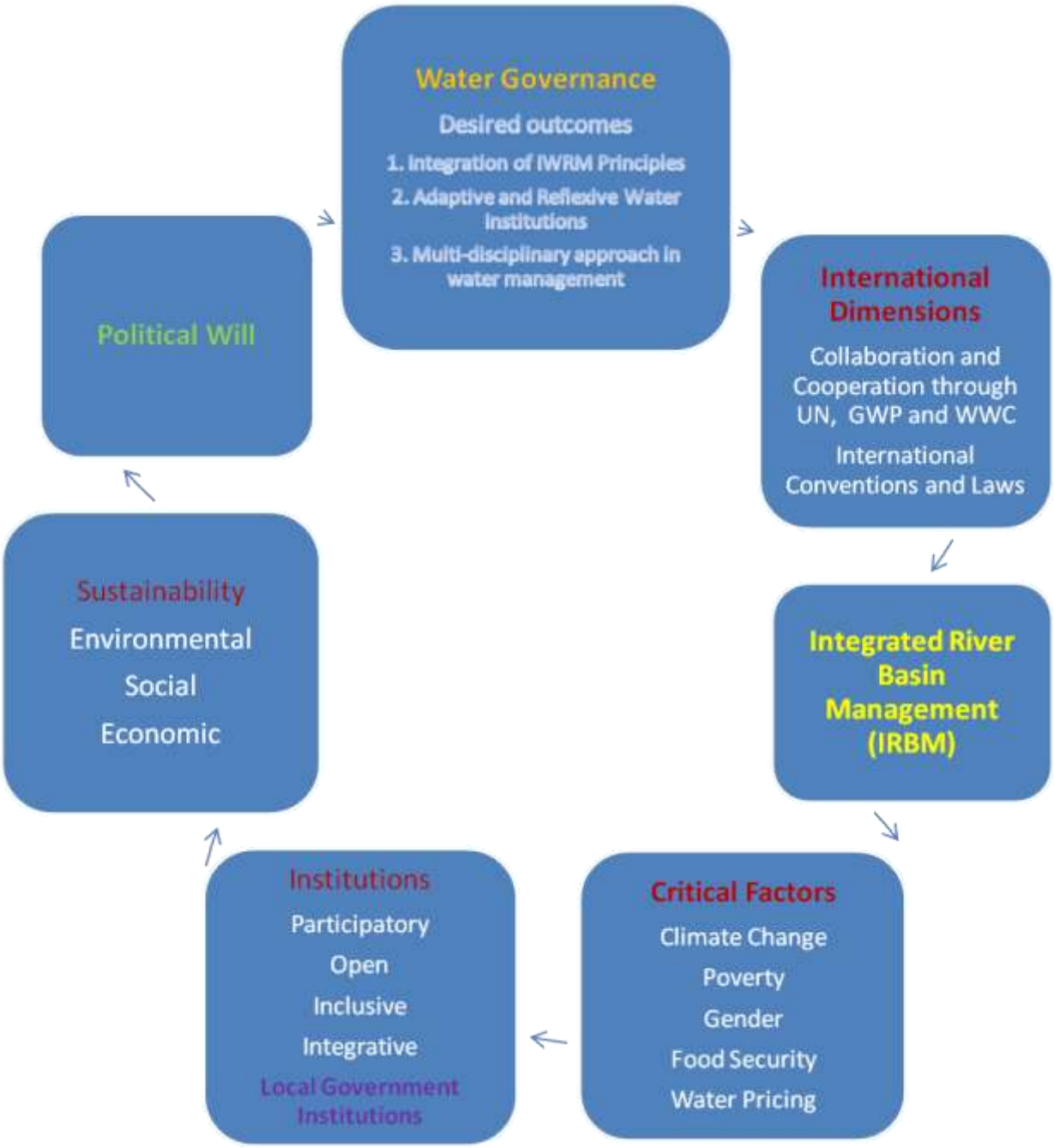

Figure 7.1 Revised Water Governance Approach

7.5 CRITICAL ISSUES FOR FURTHER RESEARCH

As it has been established that water resources management is an issue, which requires serious attention in Bangladesh, a number of critical issues related to water resources could be relevant and interesting topics for future research.

Water Law and Sustainable Water Resources Governance

Water law with aspects of its enforcement, water pricing, usage and pollution control could be a potential area of further research in the context of water governance in Bangladesh. Fisher (2009) discusses at length the requirement of law in the context of governance of water resources. It is argued that governance is a whole spectrum of management issues which includes institutional, constitutional and legal aspects to contribute towards the development and usage of water resources (Fisher, 2009). He gives strong argument in favour of effective water law to achieve sustainability of water resources as Fisher (2009, p. 1) points out:

> The role performed by the law is critical. The law by itself cannot ensure sustainable water resources governance. But, in the absence of appropriate and effective legal arrangements, the sustainable use and development of water resources are unlikely to be achieved (Fisher, 2009).

The qualitative research carried out in the study also shows that international cooperation and laws and conventions are important for Bangladesh to deliver effective water resources governance to translate the principles of IWRM.

Local Government Institutions and Water Governance

It transpires from the current study that institutions, particularly local government bodies can play a pivotal role in achieving effective water governance to implement IWRM in Bangladesh. It has been argued in the thesis that real participation in the development and planning of water resources in Bangladesh could be ensured through strengthening the local government institutions. Therefore, another very interesting topic for further research could be local government bodies and water management with particular emphasis on decentralization, effective monitoring, effective participation, democratization and constitutional provision.

In the context of IPSWAM project a technical report was conducted where it has been acknowledged the need to have 'establishing lasting relationships between the Local Government Institutions (LGI) representatives, the WMOs and BWDB by involving them in the planning process' (Government of Bangladesh and Government of Netherlands, 2004, p.58). The report emphasises the importance of local government in the water governance in Bangladesh as it says (GOB and GON, 2004, p. 58):

> Involvement of the LGI representative in the planning and implementation of water management activities on behalf of a WMO smoothens its relationship with the district administration and contributes to an improved relation with other line departments. The LGI representatives also play a role in conflict resolution, since their leadership is in

many cases well respected (Government of Bangladesh and Government of Netherlands, 2004)

Transboundary Water Resources Governance

International law permits individual states which are endowed with water courses to exercise the right to control territorial resources. As per *the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 1997 individual nation can* utilise rivers, lakes and aquifers in 'an equitable and reasonable manner'. There is significant controversy over the meaning of what constitutes an equitable and reasonable utilisation and when another state is adversely affected by this interpretation. In different places around the world including in South Asia there have been many international conflicts arisen concerning the use of inter- national freshwater resources (Haftendorn, 2000).

The current study also suggests that Bangladesh could tackle many social, economic and environmental issues if regional cooperation in the water resources could be developed. One of the important areas could have been energy demand mitigation through generating hydroelectricity, poverty reduction and eco-system management. The qualitative research indicates that Bangladesh could effectively and efficiently manage water resources to translate the principles of IWRM through a regional collaboration like South Asian Association for Regional Cooperation (SAARC).

A potential area of further research could be Integrated River Basin Management (IRBM) to address flood management, environmental management and biodiversity, river transportation, sea port, trade and commerce, water and sanitation, poverty reduction and food security in South Asia.

APPENDIX-I

QUESTIONNAIRE TEMPLATE FOR PARTICIPANTS IN BANGLADESH ON WATER MANAGEMENT AND GOVERNANCE ISSUES

1. Are you familiar with *Integrated Water Resource Management* or *IWRM* as it is often called?
2. In your opinion was IWRM successful in achieving these outcomes in Bangladesh?
3. Can you describe what elements helped IWRM to be successful in Bangladesh?
4. Can you also mention what elements did not help IWRM to be implemented in Bangladesh?
5. Do you consider that this proposed water governance approach might be helpful to deliver IWRM outcomes in Bangladesh?
6. Are existing water policies in Bangladesh achieving sustainability in terms of the environmental aspects?
7. Is the current water regime in Bangladesh socially sustainable?
8. Have gender issues in the water sector been well considered?
9. Is water management in Bangladesh economically sustainable?
10. Do the current institutions responsible for water management in Bangladesh have the attributes of participatory, inclusive, open and integrative in dealing with water resources?
11. What would be your recommendations, if institutions lack those attributes, to make those institutions participatory, inclusive, open and integrative?
12. Has the current institutional framework adequately taken into consideration all sustainability aspects of water management?
13. What are your recommendations to incorporate the sustainability agenda in the water institutions of Bangladesh?
14. Are climate change issues important in respect of water management in Bangladesh? Please provide more details.
15. Should policy makers consider climate change including disaster management aspects whilst developing water policy?
16. How are water resources and poverty reduction linked in Bangladesh?

17. Do you agree that water projects should be linked with poverty reduction strategies in Bangladesh?

18. Has current water policy in Bangladesh included gender issues?

19. How are gender issues currently evaluated in water management in Bangladesh?

20. Bangladesh is now self sufficient in food. Do you feel that food security might be at stake in the future due to water scarcity?

21. How can Bangladesh achieve water management where supply of water for food production would be secure?

22. How important is water pricing in Bangladesh to manage water resources effectively?

23. Is the water pricing mechanism helpful to achieve IWRM?

24. Is there a strong link between institutions and these critical factors (climate change, poverty, gender, food security and water pricing) in managing water?

25. What do you suggest to establish these linkages?

26. How are these international agencies helping Bangladesh to achieve MDGs (poverty reduction, gender and water and sanitation access), climate change and food security?

27. Can international cooperation in water management deliver better results in tackling climate change in Bangladesh?

28. In your opinion how can these international agencies help Bangladesh to obtain the targets in those critical areas of climate change, poverty, MDGs and food security?

29. How could binding international conventions and laws help Bangladesh in managing water resources?

30. How is regional cooperation evaluated in this issue of IRBM? Should there be a regional framework to achieve IWRM in Bangladesh as it is lower riparian country?

31. Are there any other comments or information you would like to provide?

Thank you for your time

APPENDIX-II

CONSENT FORM FOR PARTICIPANTS

Research Project: A Reflexive Governance Structure for Integrated Water Resource Management (IWRM): A Bangladesh Case Study

I,……., have read the information contained in the Information Sheet for Participants and any questions I have asked have been answered to my satisfaction.

Yes/No

I agree to participate in this activity, realising that I may withdraw at any time.

Yes/No

I agree that research data gathered for the study may be published using a pseudonym

Yes/No

I agree to the interview being audiotape recorded and transcribed.

Yes/No

APPENDIX-III

INFORMATION SHEET FOR PARTICIPANTS

Research Project:*: A Reflexive Governance Structure for Integrated Water Resource Management (IWRM): A Bangladesh Case Study*

I wish to invite you to participate in my research on above topic. The details of the study follow and I hope you will consider being involved. I am conducting this research project for my PhD at the University of New England. *My supervisors are Professor Paul Martin (can be contacted by email* at paul.martin@une.edu.au or by phone on +61 2 6773 3811), Dr. Jacqueline Williams jacqueline.williams@une.edu.au or by phone on +61 2 6773 3587), of University of New England and Dr. Kuntala Lahiri-Dutt of Australian National University can be contacted by email at kuntala.lahiri-dutt@anu.edu.au or *by phone on* 61 2 6125 4343.

Aim of the Study:

The aim of my research is to devise a literature derived approach for reflexive Water governance for Bangladesh to implement Integrated Water Resources Management (IWRM) and then examine this approach informed by a field survey, which includes this interview as well as interviews to be taken from other stakeholders of water sector in Bangladesh. I have undertaken a literature review and developed a theoretical approach from the literature.

My research question is 'Can Reflexive governance delivers IWRM outcomes in Bangladesh?' This research may assist in policy making in the water sector of Bangladesh to devise a reflexive governance structure to deliver IWRM in the country. Three groups of people such as policy makers and experts, field level officials and direct beneficiaries of water management in the country have been identified for the interview to collect qualitative data on the water governance in Bangladesh.

Your responses to this interview will be used to improve the proposed approach for water governance to implement IWRM in Bangladesh. The interview is completely confidential. Nothing that you say will be reported in my thesis in a way that will trace you and all steps will be maintained to protect your privacy and anonymity.

Time Requirements:

The interview will take approximately 90 minutes that will be audiotaped/electronically captured.

Interviews:

The interviews will last for approximately 90 minutes. There will be a series of open-ended questions that allow you to explore your views and practices related to your education work. These interviews will be audiotape recorded or electronically captured. Following the interview, a transcript will be provided to you if you wish to see one.

Participation is completely voluntary. You may withdraw from the project at any time and there will be no disadvantage if you decide not to participate or withdraw at any time.

It is unlikely that this research will raise any personal or upsetting issues. The audiotapes will be kept in a locked filing cabinet at the researcher's office. The transcriptions will be kept in the same manner for five(5) years following thesis submission and then destroyed.

Research Process:

It is anticipated that this research will be completed by the end of 2010. The results may also be presented at conferences or written up in journals without any identifying information.

This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No.HE10/002, Valid to 09/03/2011)

Should you have any complaints concerning the manner in which this research is conducted, please contact the Research Ethics Officer at the following address:

Research Services
University of New England
Armidale, NSW 2351.
Telephone: (02) 6773 3449 Facsimile (02) 6773 3543
Email: ethics@une.edu.au

Thank you for considering this request and I look forward to further contact with you.

Regards

Md. Nazrul Islam, PhD Candidate
Department of Professions
University of New England, Australia
Mobile: 01749759079, Email: mislam@une.edu.au

Should you have concerns or queries that you do not wish to discuss with me directly, you may contact my following Supervisors:

Dr. Jacqueline Williams, AgLAW Centre
University of New England, Australia
Mobile Ph: + 61 428 542214, Email: Jacqueline.Williams@une.edu.au

Dr. Kuntala Lahiri-Dutt, Research Fellow
Resource Management in the Asia Pacific
Australian National University, Canberra
Mobile Ph: + 61 409 158 145, Email: kuntala.lahiri-dutt@anu.edu.au

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APPENDIX-IV: HUMAN RESEARCH ETHICS APPROVAL BY UNE

Ethics Office
Research Development & Integrity
Research Division
Armidale NSW 2351
Australia
Phone 02 6773 3449
Fax 02 6773 3543
jo-ann.sozou@une.edu.au
www.une.edu.au/research-services

HUMAN RESEARCH ETHICS COMMITTEE

MEMORANDUM TO: Prof P Martin & Mr N Islam
School of Agriculture & Law

This is to advise you that the Human Research Ethics Committee has approved the following:

PROJECT TITLE:	Can reflexive governance deliver IWRM outcomes in Bangladesh?
APPROVAL No.:	HE10/002
COMMENCEMENT DATE:	09/03/2010
APPROVAL VALID TO:	09/03/2011
COMMENTS:	Nil. Conditions met in full.

The Human Research Ethics Committee may grant approval for up to a maximum of three years.
For approval periods greater than 12 months, researchers are required to submit an application for renewal at each twelve-month period. All researchers are required to submit a Final Report at the completion of their project. The Progress/Final Report Form is available at the following web address: http://www.une.edu.au/research-services/researchdevelopmentintegrity/ethics/human-ethics/hrecforms.php

The *NHMRC National Statement on Ethical Conduct in Research Involving Humans* requires that researchers must report immediately to the Human Research Ethics Committee anything that might affect ethical acceptance of the protocol. This includes adverse reactions of participants, proposed changes in the protocol, and any other unforeseen events that might affect the continued ethical acceptability of the project.

In issuing this approval number, it is required that all data and consent forms are stored in a secure location for a minimum period of five years. These documents may be required for compliance audit processes during that time. If the location at which data and documentation are retained is changed within that five year period, the Research Ethics Officer should be advised of the new location.

[redacted]

09/03/2010

Jo-Ann Sozou
Secretary

APPENDIX-V

RESPONDENTS OF THE SURVEY

R=Respondent
E=Expert
P=Policy Expert
F=Focus Group
WG=Water Governance

REWG1 (Respondent one, Expert Water Governance), Water Expert in Bangladesh and former Chairman of one of Research Organisations (Dhaka, 2010)

REWG2, (Respondent two, Expert Water Governance), Bangladesh University of Engineering and Technology (Dhaka, 2010)

REWG3, (Respondent three, Expert Water Governance) Water Policy Expert, Centre for Environmental and Geographic Information Services (Dhaka, 2010)

REWG 4, (Respondent four, Expert Water Governance), Bangladesh Institute of Development Studies (Dhaka, 2010)

RFWG1 (Respondents of Focus Group-1), in the survey area at IPSWAM Project

RFWG2 (Respondents of Focus Group-2), in the survey area at IPSWAM Project

RPWG 1 (Respondent Policy Water Governance number one), Government of Bangladesh (Dhaka, 2010)

RPWG2, (Respondent Policy Water Governance number two), Ministry of Water Resources, Government of Bangladesh (Dhaka, 2010)

RPWG3, (Respondent Policy Water Governance number three), Water Resources Planning Organisation, Government of Bangladesh (Dhaka, 2010)

RPWG4, (Respondent Policy Water Governance number four), Bangladesh Water Development Board (Dhaka, 2010)

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