Chapter 3

THE DESECURITIZATION OF WATER RESOURCE MANAGEMENT: A LITERATURE REVIEW

3.1 Introduction

In the previous chapter, the dynamics of the securitization of water resource management were examined in some detail. By using an extreme example - the Jordan River basin - in order to illustrate the probable outcome of basin closure, it was shown that even within the process of securitization, elements of the desecuritization dynamic could also be found. In fact, the elements of a water regime can be found in the midst of the other high politics that is characteristic of the Jordan River basin. This chapter will examine the dynamics of desecuritization of water resource management in closed river basins in more detail, by focusing on regimes as critical components of a confidence-building measure. This will be followed by a critical assessment of the role of second-order resources in establishing regimes and appropriate water management institutions.

3.2 Alternatives to the Securitization of Water Resource Management

As indicated from the literature review related to the securitization of water resource management (see Chapter 2), basin closure triggers rising perceptions of insecurity, which can lead to the systematic securitization of water resource management and the classification of hydrological data as secret. This in turn stunts institutional development, which merely exacerbates the threat perception, and so the conflict potential rises exponentially.

Salmi (1997:15) has concluded that one of the main elements of the Middle Eastern hydropolitical problem is derived from the "consequent political uncertainty … that prevents joint management of, and accountability for, largely shared water resources". Therefore, if the most likely outcome of basin closure is an escalation of conflict potential, the stunting of institutional development and the debilitating effects of a zero-sum outcome because of: the securitization of water resource management; the classification of hydrological data; and a strongly articulated hydraulic mission that is underscored by a well-defined sanctioned discourse; then one needs to ask what alternatives to the securitization of water resource management exist?

It therefore becomes potentially fruitful to examine what role regime creation can play in the desecuritization (and consequent politicization) of the problems related to the management of water resources in closed international river basins. In this regard politicization can lead to the development of durable institutions that function at the inter-state level, thereby attenuating conflict potential and changing the dynamics of a zero-sum outcome, into those of a plus-sum outcome. In his study of institutions, Putnam (1993:177) found that:

> "Norms of generalized reciprocity and networks of civic engagement encourage social trust and cooperation because they reduce incentives to defect, *reduce uncertainty*, and provide models for future cooperation. *Trust itself is an emergent property of the social system*, as much as a personal attribute. Individuals are able to be trusting (and not merely gullible) because of the social norms and networks within which their actions are embedded. … Stocks of social capital, such as trust, norms and networks, tend to be self-reinforcing and cumulative. Virtuous circles result in social equilibria with high levels of cooperation, trust, reciprocity, civic engagement, and collective well-being (emphasis added)."

So if networks of civic engagement foster norms of reciprocity, it is illuminating to know that when applied to the hydropolitical relations within the international political system, regime theory appears to be a relevant tool in the analysis of how one might find compromise solutions (Du Plessis, 2000 in Jägerskog, 2002:74; Putnam, 1993:173).

3.2.1 Introduction to Regime Theory

A central hypothesis of regime theory is that the chances of a successful regime formation are higher the more limited and well defined the issue is (Gupta *et al.*, 1993:13). This makes it very relevant to the international dimension of the South African water sector. Gupta *et al* (1993:1) note that the central questions to regime theory are:

- Why do countries cooperate with each other on different issues?
- What constitutes sufficient common interest of all the participating countries to engage in the process of cooperation?
- What are the reasons that bring countries together?
- What are the factors and actors that help in the process of cooperation between states?

However, the opportunities for cooperation between states depend on the associations and linkages made by negotiators and actors who represent the different states. This introduces the possibility of another major variable - different actors associate different items with the issue in question, leading to a series of linkages with other issues. These linkages can then either mitigate against, or multiply the chances of the issue being effectively dealt with and resolved. In this regard (Gupta *et al.*, 1993:2) state the following:

> "Since international negotiators negotiate on behalf of their countries, and as countries are complex units having political systems ranging from democratic to dictatorial, their ability to negotiate effectively on a problem is made more complicated by their ability or mandate to negotiate on behalf of their country. *Negotiators are generally only allowed to deal in the range of possibilities, which are acceptable to the ruling party in their country and compatible with the national conditions. In this process they tend to represent the dominant actors in the society.* However, the power of these actors is not static and thus the domestic conditions of a country, as distinct from the so-called 'national interest' of a nation, become important factors in influencing international decision-making" (emphasis added).

This statement is highly relevant to this study, because evidence is starting to emerge that shows regime creation is taking place in some international river basins, including the highly contested Jordan River basin (Jägerskog, 2002:76). So the question is, can regime theory provide an insight into the dynamics of these negotiations? Does regime theory allow for an adequate explanation of the events in question? Does regime theory provide an adequate explanation as to why some negotiations were highly successful, whereas other failed? If so, does regime theory help by showing why failures occurred and therefore highlighting what needs to be done to make these negotiations succeed? Do the structures that these negotiations resulted in constitute regimes?

3.2.2 An Overview of Regime Theory

In order to answer these questions, it is necessary to understand what regime theory is, and to place it among other theories. Regime theory forms part of the upsurge of neo-liberal institutionalism in various social sciences (March & Olsen, 1984; North, 1990; Keck, 1991). This neo-institutionalism starts with the assumption that there are man-made rules, habits, perceptions and expectations that are ingrained within society, and

that these serve to constrain the behavior of specific role-players (Gupta *et al.*, 1993). In this regard, there is an overlap with research into the agent-structure problem that tries to determine whether people, acting as agents, make history; or whether the structures in which these people find themselves determine the actions of the agents in the process of making history (Giddens, 1979; Wendt, 1987; Dessler, 1989). Regimes can be regarded as a specialized category of institutions (Gupta *et al.*, 1993).

According to Gupta *et al* (1993) during the 1980s within the broad discipline of international relations, there were three main streams of theory, some of which are still in evidence. Regime theory plays a role in all three streams of thought, and proponents of each stream make contributions to regime theory although the majority of these contributions come from pluralists (Hollis & Smith, 1990; Viotti & Kauppi, 1993). These three streams were *realism* (including classic realists, neo-realists, utilitarianists and behavioralists); *pluralism* (including interdependence theorists and transnationalists); and *structuralism* (including dependency and world system theorists).

Regime theory has the additional advantage of helping to close the gap between international relations as a component of political science and public international law (Slaughter, 1993:217-222). According to Gupta *et al* (1993) regime theory actually dominates the discourse on international cooperation in the discipline of international relations. In this regard the work done by Haas (1980) and Axelrod (1984) is of great significance. Axelrod's theory is more applicable to the conditions of cooperation between two parties, making it specifically relevant to bilateral regimes. Regime theory was developed at a time when US hegemony was on the decline, and as such it helps to explain how international cooperation can take place in the absence of hegemonic coercion (Gupta *et al.*, 1993).

A fundamental point of departure for regime theory is that power configurations in the international system differ from issue to issue (Gupta *et al.*, 1993). For example, while the OPEC countries are very powerful in the field of international energy policy, they are quite powerless in the field of international technology policy and technology transfers. Therefore regime theory takes it for granted that the conditions for regime creation differ from issue-area to issue-area. Consequently, regime analysis is always issue-specific, with one major field in which it is effectively being applied being international environmental policy of which water is a component. In fact, regime theory has become the dominant theory that has been applied to the analysis of international environmental

politics (List & Rittberger, 1992). One of the reasons for this is related to the fact that threats and vulnerabilities in the environmental sector are issue-specific, and are seldom universal (Buzan *et al.,* 1998:85). Moreover, causes and effects may be located at different levels and in different regions (Buzan *et al.,* 1998:85).

Prior to the development of regime theory, this was the domain of the theory of collective goods and global commons, which tended to predict non-collaboration (Morse, 1977; Hart & Cowhey, 1977; Ruggie, 1972). The development of regime theory is a reaction to the empirical fact that international cooperation has developed to some extent even in fields that have been characterized by "the tragedy of the commons" thinking (Gupta *et al.,* 1993). In addition to this, the discrepancy of localized effects has a major impact on building successful international regimes, to the extent that it may even be better to perceive such acts as being the prevention of the need for securitization, or what may be called desecuritization (Buzan *et al.,* 1998:87).

The term regime was first used by Young in 1973 when he used it to describe a system of governing arrangements for a given social structure or region (Gupta *et al.,* 1993). Young later went on to see resource regimes as a subset of social institutions, and subsequently he used regime theory to explain the nature of international cooperation in the absence of a world government. Krasner (1982:186; 1983:2) eventually went on to provide what became accepted as the most authoritative definition of a regime (see Chapter 1). As such, a regime is characterized by two important components: the *substantive element* consisting of principles, rights, obligations and rules; and the *procedural element* consisting of decision-making procedures, organization and institutions (Gupta *et al.,* 1993).

As such, the establishment of an institution/s to facilitate the discussions, negotiations and implementation of such norms usually accompanies a regime. As Haas (1989:377) notes, regimes "may also serve as important vehicles for international learning that produce convergent state policies". Regimes tend to be issue-specific, function either formally or informally, can be evolutionary or revolutionary and can have a distributive bias (Puchala & Hopkins, 1982). The threshold for recognizing a regime is when the substantive and procedural elements display some degree of durability and effectiveness (Gupta *et al.,* 1993). Details of this are shown in Table 10.

Table 10. Contents of a Regime.

Substantive Element	Procedural Element
- principles - rights and responsibilities - rules	- procedures (including definition of who the actors are) - organization

Source: Tübingen Conference as cited by Gupta *et al.*, 1993.

Gupta *et al* (1993) note that there are some negative aspects of regime theory that need to be considered. The limitations of traditional regime theory are that it concentrates on what has been agreed upon at the cost of what has not been achieved; overemphasizes the static and not the dynamic (Strange, 1982); is inherently conservative with an inflexible value bias; is both state and technocentric (critical theory); reflects the rules and norms rather than the powers and interests (structuralist theory); does not take into account the domestic circumstances that led to the adoption of certain decisions; and tends to be too issue-specific (Junne, 1992). In order to overcome these possible shortcomings, Gupta *et al* (1993) have developed a framework that indicates the visible and less visible elements of a regime (see Table 11). In this regard, these authors note that it is the less visible elements that filter out information and therefore help in the preparation of a national position on a given issue, and ultimately in the negotiation of this national position in an international environment.

Table 11. Visible and Less Visible Components of a Regime.

	Substantive Element	Procedural Element
Visible Component	- goal - principles - rights and responsibilities - rules	- procedural principles - procedures and practices - organization
Less Visible Component	- morals (cultural) - ideology (values, perceptions) - interests - conditions (domestic) - hidden agenda (domestic & regional)	- national procedures & strategy - procedural problems - informal decision-making - networking & influence from other sectors

Source: Adapted from Gupta *et al.*, 1993.

Gupta *et al* (1993) note that regimes tend to form slowly over time. Putnam (1993:184-185) maintains that the periods of time needed may even embrace centuries. In this regard, regime theory has thus far offered no satisfactory explanation for regime creation (Gupta, *et al.*, 1993). Having said this, they conclude that once common interests have developed between role-players, then regime theory does provide an adequate explanation of how these regimes develop further. For regime formation and development to occur, states need to share a common belief or perception of a problem, and then to translate this into a belief in the common proposed solution to that problem. This is highly relevant to water resource management as will be subsequently shown. As such one of the empirically verifiable indicators that have been selected for the South African case study, focuses on the change in definition of the core water management problem (see Chapters 4 & 5). The process of changing the perceptions of the problem is influenced by a variety of other factors. The literature survey that was conducted by Gupta *et al* (1993) reveals a series of factors that influence regime creation. These include the growth of knowledge; the growth of consensus in knowledge; increasing understanding of the issues; growth of functional knowledge; development of common interests; breakdown of negative and conflicting interests among the negotiating parties; the availability of an institutional forum; the growth of international coalitions; the growth of transnational coalitions; the growth of public support; the growth of regimes in neighboring fields; disasters; the likelihood of an international landmark meeting; and the redefinition of strategic interests.

Of these factors, a number are present in the water sector, of which some can be found in the Jordan River basin: those relating to the development of common interests around the shared problem of water deficit; the removal of conflicting interests that the demise of the Cold War heralded in; the redefinition of strategic interests and the role of emblematic events.

Emblematic events are of particular importance, as natural disasters like drought act as a window of opportunity during which the perceptions of role-players are forced to converge around common problems rather than to remain focused on clashing national interests. As such, these natural events become the primary stimulus for regime creation, and can be used to explain why regimes come into being in the first place, given the fact that this aspect is missing from existing regime theory.

Table 12. The Gradual Factors and Actors within Regimes.

Factors	Actors (individual and community specific)
Issue-specific	
- Growth of knowledge, information. - Spread of functional knowledge. - Increase in understanding of the issue, lending itself to the formulation of salient solutions. - Growth of social learning. - Domestic growth of such knowledge.	- Science and social science researchers. - NGOs and epistemic communities. - Journalists & the media. - Policymakers.
Interest -specific	
- Development of common political interest in the issue (international & domestic). - The breakdown of negative & conflicting interests (international & domestic). - Rational anticipation of future benefits.	- Politicians. - Policymakers & negotiators. - NGOs. - Journalists & the media.
Ideology-specific	
- The spread of an ideology (international & domestic). - The dissolving of conflicting ideologies (international & domestic).	- Politicians. - Leaders (social, religious, industrial, philosophers). - NGOs.
Institution and Organization Specific	
- The availability of an appropriate institutional & organizational forum. - Growth of international governmental coalitions. - Growth of transnational coalitions. - Growth of public support. - Growth of regimes in neighbouring fields (demonstrative effect, precedent). - Growth of domestic institutions to facilitate the formulation of a national position.	- Politicians. - Leaders. - International diplomats. - NGOs. - UN.

Source: Adapted from Gupta *et al.*, 1993.

In this regard, Gupta *et al* (1993) note what they consider to be gradual and immediate factors (see Table 13). *Gradual factors* consist of the buildup of knowledge on the issue, its translation into functional knowledge, the recognition of a common problem/situation, its emergence onto the political agenda and the simultaneous public acceptance of the problem (see Table 12). *Immediate factors* consist of those factors that make the quantum leap necessary to move from knowledge about an issue, to political action about the same issue. This can include a natural disaster, charismatic leadership, and recognition of a security risk or the strategic requirements of a hegemon.

Table 13. The Immediate Factors and Actors within Regimes.

Factors	**Actors** (individual and community specific)
Issue -specific	
- Disaster indicating the likelihood of a predicted trend.	- Victims, support groups, relevant officials, journalists etc.
Institution & Organization Specific	
-The coming up of a landmark meeting.	- Organizers, politicians, NGOs, journalists.
Interest-specific	
- Hegemonic redefinition of strategic interest.	- Politicians, advisers.

Source: Adapted from Gupta *et al.*, 1993.

The distinction between the two (immediate and gradual factors) is based on the time taken, and urgency with which the factors influence regime formation and development (Gupta *et al.*, 1993). In addition, these factors do not exist on their own, but are linked to corresponding actors who either create or promote the factors leading to regime creation. Although it is possible to study the factors and actors separately, such a study is less revealing than one, which takes into account when, and how, the actors are in a position to create or promote the factors. Furthermore, a study of the actors in relation to the factors provides a deeper understanding of the ideologies, interests and power of the individual role-players (Gupta *et al.*, 1993). This is particularly relevant in the Jordan River basin case study, as it provides an opportunity to determine to what extent ideologies, interests and the power of the individual negotiators are present in regime formation.

The range of factors evident in the literature relate to various aspects. Gupta *et al* (1993) have summarized and analyzed these, coming up with four main categories (see Tables 12 & 13). These are:

Issue-specific factors that help to understand the issue and the way in which it can be resolved.

Interest-specific factors, in combination with issue-specific factors, become more powerful. Interest factors on their own may lead to political frustration, because although there is a political commitment, if it is unaccompanied by an acceptable solution, measure or instrument, then this may lead to a deadlock in negotiations.

Ideology-specific factors that are driven entirely by specific ideological viewpoints.

Organization-specific factors that are unique to a given institutional structure.

A regime may have a long-term objective that may even be a century away, such as the United Nations Framework Convention on Climate Change (UNFCCC). It therefore becomes necessary to develop indicators of the success of a regime. To this end Gupta *et al* (1993) conclude that there are two distinct aspects that need to be considered. These are:

Quantitative aspects such as the number of participating countries, the sum of resources devoted to the issue, the number of meetings held, and the number of delegates attending such meetings. Pure numbers are not always an indication of success however, because in agreements between sovereign entities the highest/lowest common denominator rule applies. This means that the highest of the common positions between all negotiating parties will provide the content of the agreement.

Qualitative aspects such as the persistence of the commitments and the implementation thereof. This includes the level of agreement reached determined by a factor of national positions and international bargaining (rules, linkages, leadership and probable outcome) and pressures from outside; and the level of implementation determined by a factor of international bargaining and national positions.

For cooperation to be successful, it therefore becomes necessary for all affected countries to become involved. This raises the central question as to why countries cooperate? Is it in their national interest to cooperate? Do they have a common interest in the issue? Do they in fact need to have a common interest in the issue? Can countries with divergent interests cooperate on a particular issue?

Gupta *et al* (1993) respond to these questions by saying that countries cooperate on the basis of an explicitly defined or implicit national position or statement. This is combined with the mandate of the negotiator and his/her personal skills - introducing the concept of second-order resources that will subsequently be examined - ultimately determining the contents of the statement that is presented in an international forum. Therefore the statements made by negotiators represent the aggregated national position on a specific issue, and as such need to be studied in order to identify the motivations, anxieties, interests and vulnerabilities of the individual countries concerned. However, the national position is itself the result of a series of interactions between interest groups at the national level. This level of the process is usually neglected in research on regime formation. To this end it is illuminating to read that:

> "When nations negotiate, often the toughest bargaining is not between nations but within them. The reason is simple: international agreements, no matter how much in the national 'interest' [sic], inevitably have differential effects on the factional concerns. … (E)xperienced negotiators almost invariably insist that the more difficult part of their job consists not in dealing with their adversary across the table but in handling interest groups, bureaucrats and politicians at home" (Mayer, 1992:793).

At a general level, Gupta *et al* (1993) note that cooperative behavior is expected from countries. This encourages reciprocal cooperation from other countries and in other fields. Negotiators therefore use politics symbolically in expressing their cooperation, thus making a symbolic contribution to the future whilst defending present national interests. Furthermore, countries may have an interest in maintaining legal and social stability and the maintenance of the *status quo*, leading to cooperation.

Because international bargaining is concerned with relative gains and the distribution of the costs and benefits of cooperation (neo-realist position), states tend to want to maximize their absolute gains (neo-liberal position). As a result states tend to be positional rather than atomistic actors and they are wary of obligations that may have

negative implications for their relative position (Hurrell, 1991). Some theorists identify the "need to belong to the club" as a dominant motivation for cooperation, providing weak states with external legal recognition (Gupta *et al.,* 1993; Swatuk, 2000:183). This suggests that hegemonic states in a closed river basin may be less willing to negotiate regimes, while weaker states will be more willing to initiate negotiations. The question is then raised as to what thresholds (if any) to the desire to negotiate can be isolated. Structuralists argue that states are socialized into the game of power politics irrespective of their domestic situations (Hurrell, 1991). Cooperation may be the result of international political pressure, and side payments may secure cooperation (Mayer, 1992). These payments can take the form of political support, financial aid and technology transfers in other fields. This is relevant to the strategic level of analysis.

At a more issue-specific level, cooperation may be initiated in recognition of a common problem, although this is not considered to be a necessary condition for regime formation (Young, 1989). Cooperation may also be furthered by the recognition of solutions that are attractive, even if the problem itself is of little real concern to the specific country (Gupta *et al.,* 1993). Cooperative behaviour may also be elicited from the desire by a state concerned to adopt a precautionary principle. Where problems are extremely complex and uncertain, the negotiators tend to cooperate cautiously (Caldwell, 1988). Under these conditions, negotiators tend to focus on key problems and to reconcile the differences in approach (Young & Osherenko, 1991). In addition to this, the desire for cooperation cannot be separated from the negotiators themselves. In this regard they negotiate on behalf of a government, and as such their personal awareness, interest, commitment and negotiating skills may shape the definition of the national position. This again raises the relevance of second-order resources, which will be analyzed in more detail subsequently. Therefore in all cases one is not really dealing with an objective definition of a country position, but rather with the subjective perceptions of the negotiators colored by the institutional setting in which it is made and perpetuated (Gupta *et al*., 1993).

Gupta *et al* (1993) note that it is necessary to analyze the divergent motivations of different countries in the negotiating process because:

- If countries are not sufficiently motivated, the agreements they sign may not be ratified or implemented.
- The reasons for disagreement can be broken down in order to devise a solution to the perceived problem.

- By analyzing the range of motivations for each country, a range of acceptable solutions can be found for each country, or groups of countries.
- Research has shown that when cooperation is based on the symbolic use of politics, countries frequently have negative inclinations about their positive obligations (Caldwell, 1988).

In regime theory, linkage between different issues is generally expected to have a positive impact on regime creation, with two possible permutations (Gupta *et al.*, 1993:13). Firstly, they may induce the different actors to comply with the principles, rules and norms of the regime, even in the absence of a formal compliance mechanism, out of fear that other parties may retaliate in other areas or refuse to cooperate in areas of strong interest to the party concerned. Secondly, they make it possible to come up with package deals and compensation for parties in return for concessions in one field that may result in favourable negotiations in other issue-areas.

Having noted this, it is also important to understand the nature of these linkages to other issue-areas, because they make the negotiations more complex, leading to antagonistic relations between the negotiating parties. To this end, Gupta *et al* (1993) have identified six types of linkages.

Material linkages are linkages that cannot be separated because one is part of another.

Political linkages reflect the dominant preoccupation or "mind set" of the actors concerned.

Bargaining linkages are linkages that are consciously constructed to create bargaining chips for the negotiators.

Organizational linkages result from the specific forum in which an international debate takes place. Because of this, norms and principles that are developed in one issue-area can gain access to another.

Procedural linkages can result from parallel negotiation processes in the same or another forum, which could lead to a specific timing of the negotiations (such as when ministers and conference facilities are available).

Conceptual linkages refers to concepts that are used in one setting that may emerge subsequently in another context, linking the two otherwise unrelated issues together.

For this reason, Gupta *et al* (1993) suggest a research methodology that focuses on three critical aspects.

(a) How do actors define the situation?

(b) What changes do the role-players make in their definitions of the situation and their preference structure?

(c) What vision do governments and all of the other relevant actors have?

3.2.3 The Relevance of Regime Theory to Closed River Basins

Jägerskog (2002:73) has been doing research on the Jordan River basin and has come to the conclusion that despite the high levels of conflict that are endemic to the region, there is some evidence to show that a regime is emerging. More specifically, Jägerskog (2002:75) develops the notion of a water regime as a specific form of regime. He develops his argument by starting off with the focus of contemporary hydropolitical literature. In this regard, the Jordan River basin has often been used as a case for showing that water might indeed lead to conflict and even war (Bulloch & Darwish, 1993; Starr, 1991). Some authors have shown the weakness of this reasoning however (Allan, 1999; Allan, 2000; Isaac, 1995; Wolf & Hamner, 2000). In particular, Allan (1999; 2000) has shown that virtual water - the water embedded in foodstuffs - has played a significant conflict-mitigating role in the region. In addition to this, most authors focusing on the potential for war have tended to neglect that something like a water regime has been in place for some time already. This regime has regulated the hydropolitical relations between Israel and Jordan since the early 1950s. Although Israel and Jordan were embroiled in a state of war for a long period of time, they have in fact had a lot of low-key cooperation on shared water resources. This regime has been remarkably durable in the face of the endemic political conflict, and has provided a means to build trust among the states, and therefore to potentially de-escalate political tensions.

Central to this was the Johnston United Water Plan for the management of the Jordan River basin (Jägerskog, 2002:76). Wolf (1993) notes that this can be seen as a water

regime despite the fact that it was not officially recognized by the respective riparian states. In this regard it has been used as a baseline for hydropolitical relations in the basin. This is significant because unlike an international treaty, in which the rights and obligations of all parties have been codified, a regime is a social institution in which the behavior of the relevant role-players is regulated (List & Rittberger, 1992). A regime can therefore be based on an informal understanding between riparian states, and need not only be in the form of an officially sanctioned document. One might consequently argue that the water agreement between Israel and Jordan, which is a part of the 1994 Israeli/Jordanian Peace Accord, has merely enhanced and formalized the long standing hydropolitical regime that has existed between the two states, and which has continued to function, despite the broader hostilities.

Jägerskog (2002:76) notes that this is in keeping with the findings by various authors on regime theory. For example, Keohane (1984) holds that international regimes should be distinguished from specific interstate agreements. In this regard a major function of regimes is to facilitate the making of subsequent agreements. There are some differing views however. Young (1989) argues that if this were the case, then regime analysis would merely resemble an analysis of explicit bargaining. Young goes on to argue that both normative frameworks (which are not formalized in agreements), and formal agreements, constitute a regime. Jägerskog (2002:76) supports Young's argument and views the Israeli-Jordanian hydropolitical relations as a water regime, for which he accepts the definition that has been developed by Haftendorn (2000) (see Chapter 1).

Jägerskog (2002:76) identifies the need to be able to assess the quality of the water regime presumed to exist between Israel and Jordan. Jägerskog makes use of the conceptual tools that have been provided by Hasenclever *et al* (1997), in which they maintain that one should analyze the effectiveness, robustness and resilience of regimes. In this regard, the *effectiveness* of a regime is dependent on whether its members abide by its norms and rules over time; the *robustness* refers to the durability of a regime in the face of various exogenous challenges; and *resilience* refers to the ability of the regime to adapt itself to changing circumstances.

Jägerskog (2002:77) applies these three criteria to the Jordan River basin case study and concludes that the regime between Israel and Jordan has been somewhat limited in its effectiveness as conflicts (not on water) between the two riparian states have forced them not to abide by the rules of the regime at all times. Having said that, it is apparent in the

1994 Israeli/Jordanian Peace Accord that many of the principles existing at the international level, such as the provision not to cause significant harm, have been incorporated. Furthermore, an institution known as the Joint Water Committee was established in order to implement and monitor the agreed principles. It is positive to see that emphasis has been put on cooperation in the maintenance of the common resource. As water experts have been an integral part of the negotiations leading up to these principles, it is argued that scientific consensus has clearly put its mark on the regime.

Concerning the robustness and resilience of the regime, Jägerskog (2002:77) argues that it is in fact strong. Although it was severely challenged during the 1998-2000 drought, which produced some disagreement over the allocation of water, this was partly due to the fact that no provisions had been made for droughts in the earlier 1994 Israeli/Jordanian Peace Accord. This conflict was amicably resolved, and it can be argued that the norms, rules and principles that were already part of the informal aspect of the water regime, played a significant role in gaining consensus at a time where tensions could easily have escalated. In this regard it is also interesting to analyze the Israeli-Palestinian hydropolitical relations over time. Although still awaiting a final peace agreement between Israel and the Palestinian Authority, an interim agreement exists in which water is an integral part. As in the Israeli-Jordanian case there is also a Joint Water Committee. It is significant to note that even in the midst of the tensions during the *al-Quds Intifada*, which started in the autumn of 2000, the work of the Joint Water Committee has continued. A joint statement from the Israeli and the Palestinian heads of the Joint Water Committee, which was made on 31 January 2001, reaffirmed their commitment, despite exogenous challenges, to continue their cooperation. This is significant and seems to support the functionalist view of regime analysis.

Jägerskog (2002:77) continues his argument by showing that a further aspect in the analysis of this specific regime is to acknowledge the asymmetry in power relations between Israel and Jordan. He cites Keohane and Nye (1989), who argue that an asymmetrical interdependence can be the source of power with which to control resources, as well as having the potential to affect outcomes. In this regard, less dependent actors can have other political or economic resources at their disposal, which means that changes in the regime may prove less costly to them. While Israel has both an economy that is diversified, as well as being the upstream riparian (by virtue of its strategic control over the Golan Heights), Jordan is neither economically strong nor has a good negotiating position in terms of control over water (Allan, 2000:253-255). As a

result of these factors, changes in the relationship may prove more costly to Jordan than to Israel.

Jägerskog (2002:77-78) notes that there are some limitations to the use of regime theory when analysing international river basins. His arguments to this effect revolve around certain key issues. Firstly, while regime theory contributes to our understanding of how water cooperation might come about, it also has some limitations. Functionalist thinking (such as that articulated by Prof. Kader Asmal, in his capacity as the Stockholm Water Prize Laureate, during his acceptance speech to the Stockholm Water Symposium in 2000), is based on the assumption that cooperation over water could be a precursor to cooperation in other, more contentious, issue-areas over time. Jägerskog (2002:77) acknowledges that his own argument tends to lean in this direction, but he states that functionalist regime theory can be blind to the fact that water may be subordinated to other more important areas of dispute as shown by Allan (2000). It is consequently important to isolate and understand the hierarchy of issues in any hydropolitical analysis using regime theory. Jägerskog (2002:77) states that a realist objection to the focus on water experts as important role-players would be that it is the result of the interests of the hegemon that makes regimes come about in the first place, and so the cooperation between Jordan and Israel reflects US strategic interests more than anything else.

Secondly, when considering the focus on experts and epistemic communities, Jägerskog (2002) states that it is debatable whether the experts exert as much influence as the theory actually claims they do (Haas, 1989). In a world where policy-makers increasingly tend to consult scientific expertise, there is also a growing skepticism about the validity of their expertise, especially since complex issues are often characterized by both social and scientific controversy (Corell, 1999). The problems surrounding Bovine Spongiform Encephalopathy (BSE) - also known as Mad Cow Disease - (Hinchliffe, 2001), the global climate change debate (Turton, 2001a), and the handling of the 2001 Foot and Mouth Crisis in Britain, where scientific input is imprecise or divided, are some examples of this phenomenon. While these and other objections appear to be valid, Jägerskog (2002:78) still argues that the formation of cooperative water regimes, through the epistemic communities approach, tells us a great deal about the way that cooperation might be achieved in contested international river basins.

Jägerskog (2002:78) concludes his analysis of the Jordan River basin by saying that:

> "International water regimes might be seen as a mitigating factor in conflict, since they promote basin-wide interstate cooperation and thereby increase water security. An analysis of cooperation around water in the Jordan River basin through the prism of regime theory is helpful in explaining why cooperation has occurred in spite of the strong political conflict. When a convergence of values has occurs within a regime and cooperation is institutionalised, it is conceivably more difficult to reverse or end such cooperation. This is relevant to Southern Africa where there is an apparent desire for states to cooperate with regard to international river basins in the context of the *SADC Protocol on Shared Watercourse Systems*".

3.2.4 Linkage Between Security Complex Theory and Regime Theory

> "In political systems, facts, including those on water, which are judged to have costly political consequences, can be ignored or de-emphasized" (Allan, 2000:5).

Security issues are made so by the act of securitization, or more specifically, by declaring a referent object to be existentially threatened (Buzan *et al.,* 1998:25 & 204). As such, the security of issues like water resource management in a closing international river basin, is a quality that is placed on it by actors. The securitization of water resource management has a number of unintended consequences, such as the elevation of water development projects to the level of the undebatable, and the rapid escalation of conflict potential with a probable zero-sum outcome (Leather, 2001:131). Consequently, the desecuritization of water resource management is desirable wherever possible. Buzan *et al* (1998:209-210) concur with this view by stating that the avoidance of excessive and irrational securitization is a legitimate social, political and economic objective, and should become a long-term political goal.

Buzan *et al* (1998:71) support the view articulated by Haas *et al* (1993) that in international relations studies, the environment (as a sector) seems to be a welcome home for studies in regime theory. In early phases of regime development, scientific actors play an important role in agenda setting (Buzan *et al.,* 1998:73). This provides an important opportunity for the desecuritization of issues such as water resource management in closed international river basins, because this represents the placement of the issue onto the more open political agenda, rather that the inherently closed security agenda. In fact, the extent to which scientific arguments structure the environmental security debate is

exceptional, with the questions of evidence and acceptable proof becoming one of the clearly identifiable organizing *foci* (Buzan *et al.*, 1998:72-73).

It is important to note that concepts such as resource scarcity and sustainability have successfully mobilized public consent over time (Buzan *et al.*, 1998:74). In fact, while there is a lot of evidence that the environment is becoming increasingly politicized, such issues merely represent a sub-agendum within a larger political context. As such, while the environment shows some evidence of dramatic securitizing moves, there has actually been relatively little securitization in the form of extraordinary measures actually being applied (Buzan *et al.*, 1998:74). This view is largely supported by Du Plessis (2000:12-13) where he states that a distinction should be made between environmentalism and green politics. Environmentalism accepts the framework of existing social and political structures and seeks to ameliorate environmental problems within those structures. Green politics, on the other hand, regard those very structures as being the source of the global environmental problems, and contend that they should be challenged and overthrown (Paterson, 1996:252). Stated differently then, activists from the green politics movement seek to securitize the environment, whereas environmentalism activists merely seek to politicize (i.e. desecuritize) the environment in order to remedy the problem.

Having noted that the environment is a potential area of regime creation, it is as yet uncertain what type of political structures environmental concerns will generate (Buzan *et al.*, 1998:71). The extent to which water management regimes and RBOs are desecuritizing agents, at least in the context of South Africa, will be examined subsequently (see Chapters 4 & 5).

A driver for regime creation, and therefore the politicization (rather than securitization) of the given issue, is found in the central question (Buzan *et al.*, 1998:81) - who is responsible for doing something before it is too late? This raises the question about securitizing and desecuritizing actors. To this end, Buzan *et al* (1998:76-79) identify the following:

Lead actors (including states). The lead or veto position taken by any of these actors is usually issue-specific and of a strategic nature.

Veto actors (usually in the form of states and firms, but can also include NGOs that try to play down the impacts of environmental problems such as the US based Global Climate

Coalition (GCC)). The lead or veto position taken by any of these actors is usually issue-specific and of a strategic nature.

Support actors (which are by definition not located in the danger spots, but which can play an important role in generating support for a given issue). Because of the issue-specific nature of these positions, no overall power constellation has yet emerged.

Buzan *et al* (1998:79-80) have isolated three relationships of threat that define the universe of environmental security. These are:

Threats to human civilization that come from the natural environment and which are not caused by human activity such as volcanoes, earthquakes and other natural disasters such as drought.

Threats from human activity to the natural systems or structures of the planet *when the resultant changes do seem to pose an existential threat to civilization*. At the global level an example is ozone depletion, whereas at the regional and local level the effects of natural resource extraction or abstraction provide examples of this. Dam building would fall into this category, where downstream scarcities could potentially result from this human-related activity. Even more importantly, the impacts of IBTs as instruments of resource capture can have a substantial impact on the donor river basin with international consequences if that basin is transboundary in extent.

Threats from human activity to the natural systems or structures of the planet *when the changes made do not seem to pose existential threats to human civilization*. Examples include the depletion of mineral resources, which can conceivably be substituted by technological advancements.

Significant to these is the type of effect that can become manifest, of which Buzan *et al* (1998:83-84) have isolated two, both of which involve different types of securitization. Firstly, *acute disasters* typically involve disaster or crisis management in the early stages, during which time the effects are still being securitized. The floods that hit Mozambique during 2000 are an example of this, where military forces were initially mobilized, but this military response was not sustained over time as the imminent threat receded. Secondly, *creeping disasters* involve a slow but steady deterioration in living conditions, such as those that occur from rising levels of water scarcity or water deficit. Here most of

the effects are open to securitization mainly along non-environmental lines. A feature of this is the fact that securitization focuses on conflicts in other sectors such as the economic or societal.

The effects of these can become a stimulus to regime creation, because such actions are in the realm of politics and can have the effect of resisting securitization. The role that natural disasters play in this regard is highly significant. These become emblematic events in their own right, opening up critically important windows of opportunity during which political debate, public concern and resource flows can become concentrated on specific areas of cooperation. Under such conditions, regime creation at the global or regional level is difficult to label as securitization. As Buzan *et al* (1998:83) note, when crises force the debate to change from one about causes, to one about effects, the focus of securitization tends to move into other sectors. Alcamo (2000:166) builds on this notion by suggesting that research should focus on the relationship between environmental stress and crisis, because crisis can lead to either negative impacts on security such as conflict or violence, or positive impacts such as increased levels of cooperation.

The environmental sector is complicated by the existence of a variety of issues, of which Buzan *et al* (1998:74-75) have isolated some that are highly relevant to this study. Ecosystem disruption includes aspects such as ozone depletion, pollution and desertification. Energy problems include the depletion of natural resources, scarcities of these resources and the maldistribution of these resources. Population problems include unsustainable consumption and the uncontrollable *stimuli* of population migration, either across international borders, or within states in the form of urbanization. Food problems are a complex phenomenon including poverty, famine and water deficit. Economic problems include the protection of unsustainable production modes (such as the heavy reliance on the agricultural sector for job creation or the use of dirty technologies for the same purpose) and the social instability that is inherent in the high economic growth imperative that arises from a rapid population explosion. Civil strife includes war-related environmental damage and violence stemming from environmental degradation and the resultant loss of rural livelihoods.

Due to these complicating factors, some strategic part of the environment such as water resource management, can become the referent object of environmental security, as found in the Jordan River basin. Yet, if one analyses this in more detail, the ultimate referent object of this form of environmental security is the risk of losing achieved levels of

civilization (Buzan *et al.*, 1998:75). Israeli resource capture is an example of this as it seeks to protect Zionist-inspired views about the type of civilization that the Jewish Diaspora are expected to enjoy if they choose to resettle in Israel.

Along similar lines, Buzan *et al* (1998:84) note that if we define environmental security as sustainability, then when it fails, the focus tends to shift elsewhere such as threats to the level of civilization and economic prosperity that are being enjoyed by a given social group, or citizens of a specific country. This tends to mitigate against full securitization and promotes politicization instead, which in turn can provide the stimulus for regime creation under certain conditions.

An analysis of the environmental sector reveals the existence of two distinct kinds of referent objects (Buzan *et al.*, 1998:76-77). These are the environment itself, and the nexus between the environment and civilization. Consensus does not exist on these two *foci*, so they exist in coalition, each representing a specific wing of a broader debate (Buzan *et al.*, 1998:76). This is the subject of an emerging literature on political ecology, which seeks to unravel the political construction of environmental knowledge (Stott & Sullivan, 2000:2).

3.2.5 Conclusion Regarding the Alternatives to the Securitization of Water Resource Management

The Jordan River basin case study illustrated the two possible extremes of basin closure in hydropolitical terms. The one extreme is a clear escalation in conflict potential, to the extent that water is even regarded as a *casus belli*, which catapulted water resource management into the heady heights of high politics with a high probability of a zero-sum outcome. The other extreme is a de-escalation of the conflict potential, as two of the riparian states got together in secret, and started to generate the necessary normative framework on which a future water regime could be based. Significant, as an interceding variable between these two extremes, is the role of emblematic events as windows of opportunity, during which time the dominant sanctioned discourse that drives the prevailing hydraulic mission can be examined, and changed where appropriate.

From this overview, a number of key aspects can be distilled.

One of the core elements relates to the human dimension. The uncertainties resulting from the actions of some riparian states start to be interpreted by other riparian states as being detrimental to their long-term strategic interests. Decision-making at these times normally occurs under conditions of incomplete knowledge about the actions, capacity and intentions of other riparian states, so a rapid escalation to the conflict potential within the closing river basin occurs. This gives rise to a zero-sum dynamic as each riparian seeks to maximize their claim to the dwindling resource-base through an aggressive hydraulic mission, possibly involving institutionalized resource capture.

As the stimulus for the securitization of water resource management starts to occur, the analyst needs to be very aware of the conceptual differentiation between securitizing moves and actual securitization. The latter are the desired objective of green politics activists, whereas the former are the desired objective of environmental politics activists. The interaction of these different actors can play a role in desecuritizing water resource management because they place the discourse on the open political agenda, rather than on the closed security agenda.

Emblematic events play a crucial role by opening a window of opportunity during which various special interest groups can debate the issue in public, thereby raising awareness of the problem of water deficit and basin closure at a broader social level. This can challenge the strongly articulated sanctioned discourse that drives the prevailing hydraulic mission of society, thereby transforming the hostile elite-driven zero-sum approach into a more accommodating and all-inclusive plus-sum approach to water resource management that is appropriate to closed international river basins.

This raises the question about cooperation rather than competition, and the notion of a water regime takes root within the echelons of the hydropolitical elite. Consequently regimes can be regarded as being intervening variables in the overall hydropolitical equation. Regimes can result in the following:

(a) The potential zero-sum outcomes of basin closure can be transformed into plus-sum outcomes as uncertainty and perceptions of insecurity are reduced for all riparian states.

(b) Conflict potential becomes institutionalized through the development of agreed upon rules, procedures and norms.

(c) Negotiations between all riparian states (and possibly even other non-state actors) can generate confidence-building arrangements, thereby contributing to the understanding of the benefits of a plus-sum outcome for all participating parties.

(d) This starts a process of desecuritizing water resource management in closed river basins as water-issues are placed on the more open political agenda.

(e) Synergy starts to occur and a process of institutionalized learning takes place.

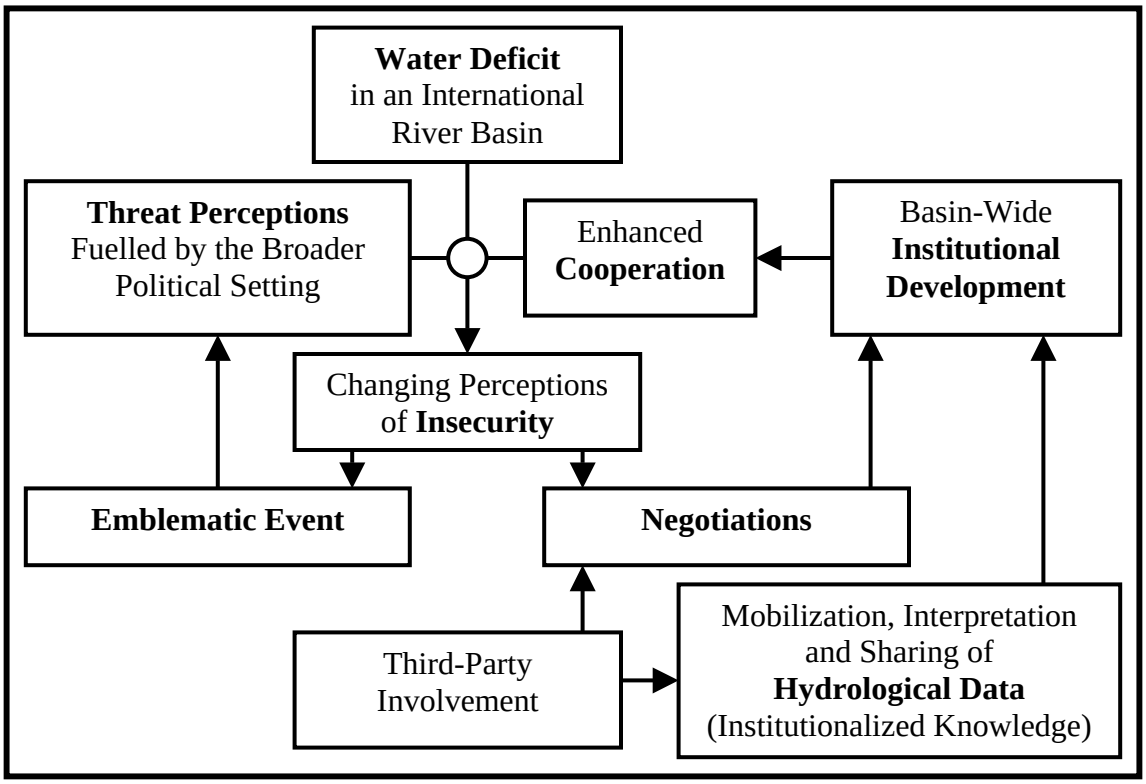
(f) The emerging regime starts to become a central depository of knowledge that is accessible to all of the parties, which in turn increases certainty and mitigates against the possible escalation of perceptions of insecurity.

For a water regime to come into existence, the riparian states need to start developing a shared perspective about the problem of basin closure. The role of emblematic events is therefore important, as they tend to narrow the range of viewpoints about the problem on hand. The role of third parties in facilitating initial contact between the various riparian states is also important. This is clearly evident in the US sponsored Johnston United Water Plan, which was not openly accepted when it was initially presented, but which has subsequently acted as a basis for additional negotiations and the narrowing of expectations to more reasonable levels.

Because third-party involvement is so important in regime creation under certain conditions, the SCT concept of overlay can become relevant. In this regard overlay occurs when an outside power exerts an influence, which has been the case with the US sponsored Johnston United Water Plan. Regimes are the result of negotiations, so the capacity of any riparian state to articulate a given position, and to convince other negotiators of the validity of that position, becomes highly relevant. This raises the issue of second-order resources in the creation and maintenance of water regimes, which will subsequently be analyzed in greater detail. The Jordan River basin case study shows that regimes, even if they exist only as informal entities, are extremely durable. As such they can survive the rigors of high politics, and can provide a setting for confidence building in other more contested political arenas. From this conclusion, the Desecuritization

Model of potential hydropolitical dynamics in closed river basins based on regime creation can be developed (see Figure 6).

Figure 6. Desecuritization Model.



3.3 Critical Elements of Regime Creation

Having established that regimes are a desirable outcome for the management of water resources in closing international river basins, and having noted that they do exist in some form in highly contested closed river basins such as the Jordan, attention is now given to isolating the critical elements of regime creation.

At present, there are four major developments taking place (or recently having taken place) in the international water sector, all of which have implications for regime creation. In this regard:

(a) Developments in international law are laying the legal foundations for regime creation in the water sector.

(b) The *Rio Declaration* and the *Dublin Statement* have become a cornerstone for the development of the normative dimension of water resource management. This has been seized by various international organizations and is now being articulated by them as a desirable set of norms and values that could be embraced in any given water regime.

(c) The Second World Water Forum (WWF) developed the so-called *World Water Vision* (WWV) that was agreed upon by many governments as reflected in the *Ministerial Declaration* (WWC, 2000a; WWC, 2000b: 64-152; Cosgrove & Rijsberman, 2000). The *World Water Vision* contains a strong normative inclination towards regime creation in shared international river basins, and has built consensus around the core elements of the *Rio Declaration* and the *Dublin Statement*.

(d) The World Commission on Dams (WCD) has analyzed the various problems that have occurred as the result of a century of dam-building, and has tabled a report containing strong normative elements that tend towards cooperation in the development of water resources in shared international river basins (WCD, 2000). As was the case with the *World Water Vision*, the *World Commission on Dams Report* has built consensus around the core elements of the *Dublin Statement* and *Rio Declaration*. As such, components of this normative dimension could find their way into the development of water regimes.

As these are a potential source of the normative foundation for regime creation that is emerging at the global level, a review of the critical elements of each is instructive.

3.3.1 International Water Law

Modern international water law has been evolving over a long period of time. With the growth in trade, navigation became an important issue over time. This was given a boost with the industrial revolution, which started to place more emphasis on the need for law related to the non-navigational use of water. Early legal development in the water sector, occurring in the first half of the twentieth century, tended to be of a bilateral nature, with agreements being reached over the management of the River Oder, the River Meuse and the use of waters found in Lake Lanoux (Eckstein, 2002:82). These agreements tended to focus on different issues, so their codification was not uniform.

Consequently, in an attempt to bring greater uniformity into international water law, the International Law Association (ILA) developed what has now become known as the *Helsinki Rules on the Uses of the Waters of International Rivers* (referred to in the international water sector by the abbreviated form as the "*Helsinki Rules*") in 1966, which were drafted as a comprehensive code of law governing international drainage basins (Boisson de Chazournes, 2003:216; Eckstein, 2002:83). The *Helsinki Rules* have become best known for their guidelines on the non-navigational use of water, and are thus regarded by many scholars as being the precursor to the subsequent *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses* - often referred to by the abbreviated form of the "*UN Convention*" - which started to evolve in 1970 and took almost three decades before it finally emerged (Boisson de Chazournes, 2003:216; Eckstein, 2002:82). While the text of the UN has been accepted, it has not been ratified by sufficient states so it technically remains a draft. Central to this legal development is the notion of equitable and reasonable apportionment of water, along with the technical data and capacity needed to make that apportionment. The *Helsinki Rules* complemented this central principle with various articles providing that no category of water use would enjoy any preference over any other (Article VI); that no states may reserve future use of water in a given river basin for itself (Article VII); and that existing activities would be deemed to be equitable and reasonable unless established to the contrary (Article VII) (Eckstein, 2002:83-85).

These rules were supplemented by a series of resolutions that were passed by the ILA, including the *Montreal Rules on Pollution* and the *Seoul Rules on International Groundwaters* (Eckstein, 2002:83). These have been accepted as the basis of negotiations between various riparian states sharing an international river basin, and as such have played an important role in the systematic codification and development of international water law, which could be used as the basis for regime creation. Unfortunately the *Helsinki Rules* have received little recognition as being an official codification of international water law, because the ILA is an NGO without any official governmental status (Eckstein, 2002:83). In order to overcome this problem, the General Assembly of the UN tasked the International Law Commission (ILC) to draft a set of agreed-upon articles for use in the governing of the various non-navigational uses of transboundary watercourses during 1970. With this official sanction by the UN, the work of the ILC received better recognition than that of the ILA, and they completed a set of *Draft Articles* by 1991, circulating these to UN member states for comments (Eckstein,

2002:83). In 1997 the General Assembly adopted the *United Nations Convention on the Non-Navigational Uses of International Watercourses*.

The *UN Convention* is intended to be a framework agreement, being flexible and open to a degree of interpretation, in order to accommodate the development of more specific bilateral and multilateral agreements on the governance of water found in international river basins. The inclusion of a dispute resolution clause has delayed the ratification of the *UN Convention.* Only twelve of the thirty-five states needed for it to enter into force have ratified the agreement, but 8 others have signed (but not yet ratified) at the time of writing (Eckstein, personal communication). This has prompted some NGOs like Green Cross International (GCI) to lobby among states for the ratification of the *UN Convention* as a question of some urgency (GCI, 2000).

Even if the *UN Convention* is never fully ratified, it still carries significant weight and will continue to influence the development of other water resource agreements (Eckstein, 2002:88; Boisson de Chazournes, 2003:217). As evidence of this both Eckstein (2002:89) and Boisson de Chazournes (2003:217) cite the fact that the 1995 *SADC Protocol on Shared Watercourse Systems* in the Southern African Development Community; the *Revised Protocol on Shared Watercourses*; the 1995 *Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin*; and the 1991 *Protocol on Common Water Resources* concluded between Argentina and Chile; are all examples of the use of these central legal concepts.

Boisson de Chazournes (2003:219-223) notes that the *UN Convention* provides five key building blocks for the management of international river basins. These are:

(a) Water sharing principles, centered on the ‘equitable and reasonable use’ principle, and the ‘no harm’ rule.

(b) A general obligation for states to cooperate in the management of international river basins, centered on the ‘due diligence’ obligation. In this regard, joint mechanisms are expected to flow from the development of the regime.

(c) The integration of the protection of the environment as a regime applicable to international watercourses through the obligation to prevent and control pollution.

(d) The provision of dispute settlement and avoidance mechanisms through the mechanism of a fact-finding commission that can be established at the request of a party.

(e) The involvement of non-state actors, even though the *UN Convention* is a classical state-oriented instrument.

Significantly however, the *UN Convention* is not yet an international regime capable of functioning at the global level (Conca & Wu, 2002). As a result of this, critical elements needed for the creation of a regime are not evident in the *UN Convention*, but some key normative elements are. Some of these key normative elements can be found in the *SADC Protocol on Shared Watercourse Systems* and its 2000 Amendment, the *Revised Protocol on Shared Watercourses* (Ramoeli, 2002:106). These include the following:

(a) Under the General Principles of the *Revised Protocol on Shared Watercourses*, cooperation is called for between all riparian states in the development of joint-projects and studies. This is in support of the overall SADC objective of cooperation in various fields of economic development. This places water cooperation in the context of regional cooperation and economic integration initiatives within SADC.

(b) Specific mention is made for the need to share all information (data) that is relevant to the development of water resources in shared river basins within the SADC region. A significant component of this is the SADC Hydrological Cycle Observing System (SADC-HYCOS) (Ramoeli, 2002:108).

(c) The development of the necessary institutional framework that will support the sustained management of water in the various shared international river basins is also a central component of the *Revised Protocol on Shared Watercourses*. In this regard the following institutions have been proposed (Ramoeli, 2002:109):

> (i) A Monitoring Unit based at the SADC Water Sector Coordination Unit (SADC-WSCU).
> (ii) River Basin Commissions (RBCs) consisting of representatives of the various riparian states found within the respective international river basins.
> (iii) River Basin Authorities (RBAs) in respect of each international river basin.
> (iv) A dispute resolution mechanism that is integrated within the overall SADC structure.

3.3.2 The *Rio Declaration* and the *Dublin Statement*

The 1972 *Declaration of the United Nations Conference on the Human Environment* that took place in Stockholm was the first recorded view by governments that the environment was fundamental to human well-being, and that its protection was a central responsibility of states and the international community as a whole (WCD, 2000:201). Emerging from these early roots, the United Nations Conference on Environment and Development (UNCED) adopted what has now become known as the *Rio Declaration on Environment and Development* during what became popularly known as the Earth Summit in 1992 (UNCED, 1992). This declaration contains twenty-seven principles, collectively known as the *Rio Principles*, many of which are relevant to water resource management and dam building in international river basins (WCD, 2000:201-202). These are as follows:

Principle 1 states that human beings are at the centre of concerns for sustainable development, and they are entitled to a healthy and productive life in harmony with nature.

Principle 3 recognizes the right to development, but notes that this must be done in a sustainable fashion.

Principle 4 calls for the integration of environmental issues into the overall development process if that development is to be sustainable over time.

Principle 10 calls for a wider public participation in the decision-making process in all matters affecting the environment. Central to this is the role of information and data in order to make informed decisions.

Principle 13 says that states are responsible for compensating the victims of environmental damage, and that they must give priority to the development of law to codify this liability.

Principle 15 calls for the precautionary approach to be adopted by states, according to their respective capacities, and the use of scientific knowledge to mitigate environmental degradation. More specifically, the lack of scientific certainty may not be used as a

reason by states to postpone cost-effective measures to prevent environmental degradation.

Principle 27 recognizes the role of indigenous knowledge in the management of environmental issues, and entrusts states to ensure the participation by such people in the attainment of national sustainable development objectives.

The Dublin Conference took place in preparation for the UNCED and was thus was part of the *Rio Declaration on Environment and Development* process. The Dublin Conference was convened separately because activists felt that water was not being given sufficient prominence in the main process. This resulted in the *Dublin Statement* (ICWE, 1992), endorsing four key principles - what are now popularly known in the global water sector as the *Dublin Principles* - that have now come to be regarded as fundamental aspects of integrated water resource management (IWRM) (Lundqvist & Gleick, 1997:30). These are:

- Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.

- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

- Women play a central role in the provision, management and safeguarding of water.

- Water has an economic value in all its competing uses and should be recognized as an economic good.

The concept of basic needs was also reaffirmed during the 1992 UNCED in Rio de Janeiro, expanding it to include the needs of aquatic ecosystems.

> "In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems" (UNCED, 1992 – quoted in Lundqvist & Gleick, 1997:21).

Implicit in this statement is the idea that basic resource requirements for human and ecological functioning, along with the allocation of sufficient resources to meet those basic needs, are the responsibility of national and local governments, as well as service providers (Lundqvist & Gleick, 1997: 21). Significantly, the role of international organizations and NGOs is also alluded to in ensuring that this is the case. In short, the notion of basic needs (inclusive of the needs of the environment) is now considered to be part of the international normative order, but many governments are as yet reluctant to endorse this as it has legal ramifications arising from non-delivery.

In addition to this, the UNCED also concluded that links between the environment and development must be recognized at the highest political level. During the various preparatory meetings for the UNCED, and associated with the Dublin Conference, what became known as *Agenda 21* was launched (Lundqvist & Gleick, 1997:28). *Agenda 21* consists of forty chapters, with freshwater being dealt with in Chapter 18. Significantly, *Agenda 21* has been officially recognized in the *Revised Protocol on Shared Watercourses* (Treaty, 2000a:2).

The World Bank almost immediately translated these issues into policy. Encapsulated formally into the *World Bank Policy Paper on Water Resources Management*, the Bank aimed at the adoption of a comprehensive policy framework, treating water as an economic good, and combining it with a decentralized management and delivery structure (World Bank, 1993; Lundqvist & Gleick, 1997: 30). The World Bank thus effectively endorsed the *Dublin Statement* and *Agenda 21*. The latest water policy of the World Bank states amongst other things that,

> "The proposed [new World Bank] approach to managing water resources builds on the lessons of experience. At its core is the adoption of a comprehensive policy framework and the treatment of water as an economic good, combined with decentralized management and delivery structures, greater reliance on pricing, and fuller participation by stakeholders. ... The adoption of a comprehensive framework for analyzing policies and options would help guide decisions about managing water resources in countries where significant problems exist, or are emerging, concerning the scarcity of water, the efficiency of service, the allocation of water, or environmental damage" (World Bank, 1993).

In 1994, the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD) endorsed the *Dublin Statement*. During the same

year, the Commission for Sustainable Development (CSD) urged international agencies such as the UN Environment Programme (UNEP), the Food and Agriculture Organization (FAO), World Health Organization (WHO), World Meteorological Organization (WMO), UN Educational Scientific and Cultural Organization (UNESCO), UN Development Programme (UNDP), and the World Bank to strengthen their efforts towards developing a comprehensive assessment of the global freshwater resources (Lundqvist & Gleick, 1997: 30). This assessment was presented at the CSD in 1997, and subsequently again to a UN General Assembly Special Session. At this point the Swedish government took on the responsibility for developing the research capacity further by commissioning the Stockholm Environment Institute (SEI).

The Global Water Partnership (GWP) and World Water Council (WWC) are recent examples of global water sector initiatives (Lundqvist & Gleick, 1997:29). Both organizations were officially launched in 1996 after extensive consultations. The activities of these two bodies relate to the establishment of a common framework that builds on the principles and visions that emerged from Dublin, and that were later incorporated into *Agenda 21*. Originally initiated by the World Bank, UNDP and the Swedish International Development Agency (SIDA), the GWP is an international network committed to the translation of the newly emerging international consensus on IWRM into comprehensive and coherent services. The major emphasis is on achieving sustainable water resource management in developing countries. The emphasis within GWP activities is on the facilitation of projects that emanate from locally defined needs. It coordinates activities and provides leadership, rather than running any given project as such, providing an example of the potential influence of third parties in water resource management in shared international river basins. Encapsulated within this is the concern for ecosystem health as this forms the foundation of livelihood security and population health.

The following statement by the GWP gives an insight into their objectives:

> "Where waters are shared, action should be taken to build confidence among riparian states, enabling them to accept some form of restricted sovereignty concerning their common resource, based on the principles of equitable utilization and on regional cooperation. Mechanisms between riparian states in all major river basins should be developed and shared waters agreements formulated by 2015. Where 'water diplomacy' is needed to help prevent

> conflict, the mediating or adjudication capacity of the UN or other bodies may be utilized" (GWP, 2000).

This statement spells out the central issue of sovereignty when it comes to water resource management, specifically calling on governments to accept that international river basins cannot be managed effectively if sovereignty is regarded as being absolute with respect to a fugitive and shared resource like water.

The WWC is aimed at promoting awareness of critical water-related issues whilst facilitating long-term efficiency in planning and managing water resources. A strong element of this is the development of an analytical think tank capability, focussing on strategic issues such as the *World Water Vision* that was announced in The Hague during March 2000. During the Third World Water Forum that was held in Japan in 2003, the Director General of UNESCO announced the creation of the Water Cooperation Facility, consisting of UNESCO, the WWC, the International Law of Arbitration and the Universities Partnership for Transboundary Waters (UPTW).

3.3.3 The *World Water Vision*

The *World Water Vision* was developed as the result of intensive international consultation prior to the Second World Water Forum that took place at The Hague during March 2000 (Cosgrove & Rijsberman, 2000; WWC, 2000a). The *World Water Vision* is designed to be a consensus document, containing the elements of water management that will be needed to make that management sustainable over time (WWC, 2000b). As such it provides the normative foundation for the subsequent development of rules, norms and procedures that would be necessary for the negotiation of water regimes in various parts of the world. Two elements of the *World Water Vision* are specifically relevant to an analysis of the critical elements of regime creation for the management of water resources.

Firstly, the reform of water resource management institutions has been identified as one of the most critical challenges. This is particularly so in the context of Southern Africa given that one third of all international rivers identified as being "at risk" are found there (Wolf *et al.*, 2003:47). In this regard, "political will must change decision-making to include all stakeholders, especially women, so that stakeholders have the power to manage their own resources" (Cosgrove & Rijsberman, 2000:41). The general effect of

this element is to decentralize water resource management away from the direct control of a small hydropolitical elite, and make those who are responsible for water resource management more accountable to the people that are affected by their decisions. In SCT jargon, this is an act of politicization and therefore desecuritization.

Secondly, due to the recognition that institutions reduce uncertainty, increasing cooperation is called for in the context of shared international river basins (North, 1990:4). Central to this is the desire to make shared water resources a source of potential cooperation, rather than a source of potential conflict (Cosgrove & Rijsberman, 2000:43). This is in keeping with the sentiments articulated by Prof. Kader Asmal (2000) (the South African Minister of Water Affairs and Forestry) in his capacity as the Stockholm Water Prize Laureate, and supported by Jägerskog (2001; 2002:73). The *World Water Vision* recognizes the complexities in the negotiation of cooperative agreements in the water sector, citing the thirty years needed to reach agreement on the *United Nations Convention on the Non-Navigational Uses of International Watercourses*. Recognizing these complexities, the *World Water Vision* calls for the following (Cosgrove & Rijsberman, 2000:44):

- The exchange of data, or efforts to jointly gather data, as a means of building confidence between riparian states.
- The development of a shared vision of any given problem occurring within a shared international river basin.
- The negotiation of international agreements for the management of water resources in a shared international river basin using the positive effects of confidence-building and cooperative initiatives outlined above.
- The development of formalized conflict resolution mechanisms as a part of any international agreement on the management of shared international river basins.

Considerable effort is now being made by the WWC and GWP to promote the *World Water Vision*, with two important developments directly linked to this. The World Summit on Sustainable Development (WSSD) that was hosted in Johannesburg during 2002 debated the overall *problematique* of sustainable development, with water resource management as a component of that overall objective. Significantly, at least one important water-related agreement was reached during a side event at the WSSD (Treaty, 2002b). Japan hosted the Third World Water Forum during March 2003 during which

renewed focus was placed on the attainment of the *World Water Vision*, and in particular in overcoming the obstacles to its full implementation. During the Third World Water Forum, the Water Cooperation Facility was launched, bringing together the specialist skills and capabilities of UNESCO, the WWC, the International Court of Arbitration and the UPTW in support of the *World Water Vision*. This is expected to increase the normative basis for regime creation in international river basins.

3.3.4 The World Commission on Dams

The World Commission on Dams (WCD) was brought into existence with a mandate to review what has become known as the "Large Dams Debate". Central to this debate is the mobilization of water and the development of hydraulic infrastructure by states as a foundation for national development priorities. The WCD set out to achieve two main objectives (WCD, 2000:xxx). The first was to review the effectiveness of large dams and assess alternatives for water resource and energy development, while the second was to develop internationally acceptable criteria, guidelines and standards where appropriate for the various phases of dam construction and management.

The WCD process was highly contested by many countries, especially those with a strongly articulated hydraulic mission that is based on the notion of aggressively harnessing water resources for the purpose of rapidly developing economies, countries and regions. Emerging from this process was a consensus position that has been captured in the *World Commission on Dams Report* (WCD, 2000). It is this consensus position, which was distilled out of a highly contested process of consultation, and a detailed review of existing dams (and in particular their performance records since completion), that has resulted in what have now become known as the WCD's Seven Strategic Priorities (WCD, 2000:213-257). Some of these are relevant to regime creation. These Seven Strategic Priorities are:

To gain public acceptance for the need to develop water resources by means of a dam. Central to this is the notion of informed participation and informed consent, both of which involve data and information being made available to all interested and affected groups of people.

To develop a comprehensive assessment of options available to decision-makers that is based on participation in the policy, institutional and technical dimensions of dam construction and management.

To foster adaptive management and operational practices of existing dams in order to reflect the constant changes taking place in the social, political, environmental and economic arenas that underpin the dam(s) in question.

To sustain rivers, river basins and their associated ecosystems, along with the livelihoods that flow from those ecosystems. Central to this is the generation and dissemination of data that is relevant to the management of the river basins and associated ecosystems and livelihoods.

To foster governance through the development of a culture based on joint negotiations that recognize the rights and share the benefits of river basin development in a more equitable fashion.

To impress on decision-makers that the compliance with agreed practices and approaches would ensure the public trust and confidence that is necessary to reduce conflict that is known to emerge from the development of large dams.

To foster the culture of interstate agreement on the joint management of international river basins. These agreements will of necessity have to be based on a shift away from a paradigm based on the promotion of national self-interest, to one that seeks to promote mutual self-interest for regional cooperation and peaceful collaboration. The storage and diversion of water in international river basins has been a known cause of considerable tension between (and within) countries in the past, so the future development of such infrastructure will increasingly become the subject of agreement between states. This has major implications for regime creation because of the large numbers of dams that already exist in international river basins, given the fact that these will now have to be managed jointly. Central to this endeavour are the *Helsinki Rules* and the *United Nations Convention on the Non-Navigational Uses of International Watercourses*, involving the establishment of a formalized dispute resolution mechanism (WCD, 2000:306).

3.3.5 Generic Elements of a Water Regime

If the sources of the normative dimensions for agreements in international river basins analyzed above provide an insight into generalized elements of regimes, then the work that has been done by various authors such as Haftendorn (2000), Ostrom (1990), Jägerskog (2001; 2002), Haas (1983), Abernethy (2001), Krasner (1983) and others (Pinheiro *et al.*, 2003) provides details of the more specific elements.

An analysis of Haftendorn's (2000:65) definition of a water regime reveals the critical elements of a water regime. Central to any water regime is the existence of a set of rules that have been agreed by the affected riparian states. These rules need to be observed by the various riparian states over time. The outcome of the application of these rules must reduce the transaction costs to the respective riparian states.

These rules will have to be negotiated between the riparian states, and will represent a set of agreed-upon procedures that all participating parties will abide by over time. If the rules are deemed to be unfair, or disadvantage any riparian state, then the agreement will break down. On the other hand, if the rules and procedures are deemed to be fair and reasonable, then the agreement will continue to exist.

The work that has been done by Elinor Ostrom (1990) provides a deeper insight into this process. Ostrom is interested in the social structures for the management of common pool resources that have evolved over time. In particular, she is interested in challenging the *Tragedy of the Commons* thesis that has been propagated by Hardin (1968). Ostrom (1990, 2-7) reviews the existing literature that forms the foundation of conventional wisdom on the management of common pool resources, which is based on three models that have been developed from various literatures and disciplines.

The first of these is the tragedy of the commons model, which has come to symbolize the degradation of the environment and the non-compliance with rules of collective governance. The key outcome of this is ruin, as each person pursues his own best interest in a world that is based on finite limits, rather than access to limitless resources (Hardin, 1968:1,244 as cited by Ostrom, 1990:2).

The second model is encapsulated in the dynamics of the prisoner's dilemma game, which is often used to formalize Hardin's tragedy of the commons model. In this game, each player has two strategies. The first is to cooperate and keep within the agreed rules. The second is to defect and to break the rules, because the risk of getting caught is limited and the benefits are potentially high. This results in a deep dilemma for the various players, all of who act without knowledge of the strategy being chosen by the other player(s). The outcome of this is generally sub-optimal (Putnam, 1993:164). As one commentator has noted, "these paradoxes cast in doubt our understanding of rationality and, in the case of the prisoner's dilemma suggest that it is impossible for rational creatures to cooperate" (Campbell, 1985:3 in Ostrom, 1990:5).

The third model is based on the logic of collective action that was developed by Mancur Olson (1965), who set out to show that the notion that groups tend to act in support of their group interests is supposed to flow logically from the widely accepted premise of rational, self-interested behaviour. Olson's (1965:2) findings are that unless the number of individuals is quite small, or unless there is coercion or some other device with which to induce compliance, then rational self-interested individuals will not act to achieve their common or group interests (Ostrom, 1990:6). Central to this is the free-rider problem (Putnam, 1993:164) (see Nicol *et al.*, 2001).

All of the outcomes of these three models are generally sub-optimal, and ultimately end up by making the participants worse off than before (Putnam, 1993:164). Ostrom (1990: 15-21) therefore seeks to develop a new model, also using game theory. This model is contrary to the conventional wisdom, and is centered on the negotiation of a binding contract, which is generally ignored in the literature. This alternative model assumes that the agreed-upon contract can be enforced, for which a series of options exist. One such option is self-enforcement, where the participants in the game have detailed and accurate information that is relevant to their decision-making. Using this model in some empirical research, Ostrom has shown that the tragedy of the commons dilemma is not always the fate of common pool resources. In fact, Ostrom has observed two possible outcomes. One is an affirmation of the tragedy of the commons thesis. The other is proof that in some cases individuals seem to have successfully developed what can loosely be called a regime (Ostrom does not use this exact terminology because she focuses on inter-group rather than inter-state behavior), and are managing their common pool resources in a sustainable and relatively conflict-free way. This leads Ostrom to ask what the difference is between these two extreme outcomes? In an answer to this question, she hypothesizes

that three critically important elements exist in the cases where common pool resources are being managed successfully, namely the participants have the capacity to communicate with one another; the participants have the capacity to develop trust; and the participants have the capacity to develop a sense of a shared future.

Significantly, all of these are second-order resources that will be analyzed in more detail in next section. They do, however, provide an insight into some of the necessary elements of regime creation. Central to this is Ostrom's (1990:183) finding that:

> "When individuals who have high discount rates and little mutual trust act independently, without the capacity to communicate, to enter into binding agreements, and to arrange for monitoring and enforcing mechanisms, they are not likely to choose jointly beneficial strategies unless such strategies happen to be their dominant strategies. The collapse of the Pacific sardine fishery (McHugh, 1972) and the collapse of the Antarctic blue whale fishery (Clark, 1977) are tragic testimony to the capacity of these models to predict outcomes in empirical situations approximating the theoretical conditions."

Consequently, a central component of any successful agreement for the management of common pool resources - a regime in the context of this study - is the social capital needed in order to learn who can be trusted, what effects the actions of individuals will have on the group, and how to organize in such a way as to gain benefits and avoid mutual harm (Ostrom, 1990:184). In this regard, rule making and rule adherence play a major role in the success of regimes, with the crucial issue of compliance monitoring being essential to provide the incentive to other participants to continue with their rule-following behavior (Ostrom, 1990:187). For an institution that is responsible for the management of common pool resources to succeed Putnam (1993:166) supports Ostrom's views that there are four critical elements needed. These are that the boundaries of the institution must be clearly defined; the affected parties must participate in the definition of the rules and procedures that will be adopted; violators of the rules (defectors) must be subjected to graduated sanctions as these reinforce the value of the norms and discourage non-compliance; and there must be a low cost mechanism for resolving conflicts.

Jägerskog (2001; 2002) has been working on understanding the dynamics of regime creation in the highly contested Jordan River basin. When analyzing his findings, it becomes apparent that elements of a successful water regime include rules and

procedures that are agreed upon by all affected role-players; the observance of these rules, including a sanction for the non-observance of the agreed-upon rules; the institutionalization of conflict potential through the consensus building efforts needed to negotiate and legitimize rules and procedures; the agreement on key issues that can be regarded as being common problems confronting all affected role-players; and a reduction in transaction costs through the negotiation of a set of procedures that are legitimate in the eyes of all the role-players.

Writing in the specific context of managing international river basins in Southern Africa, the Commissioners of the Permanent Okavango River Basin Water Commission (OKACOM) note that there are three key principles that apply to their situation (Pinheiro *et al.,* 2003:118). These are the respect for the sovereignty of each riparian state, the obligation that one state should not cause significant harm to a co-riparian state, and the requirement that the water use must be equitable and reasonable.

Other authors cite similar elements. For example, Haas (1983:58) notes that one of the most important functions of a regime is the collection and dissemination of data. Abernethy (2001) says that the primary goal of an RBO is the entrenchment of the security of rights for the participating stakeholders, through a system of rules and procedures. These act in concert to provide a framework of legality and therefore improve the security of supply in closing international river basins. In similar vein, Krasner (1983:2-3) declares that the purpose of a regime is the facilitation of agreement between the participating actors, in terms of which the principles and norms, manifest in the form of rules and procedures, define the character of the specific regime. Significantly, regimes cannot be relevant for zero-sum situations in which states act to maximize the difference between their utilities and those of others, which accounts for the paucity of regimes in the security arena (Krasner, 1983:8).

The combination of these various elements is a series of reduced transaction costs, which become the benefits that are shared as an international public good (Nicol *et al.,* 2001:3) in any successful water regime.

3.3.6 Conclusion Regarding the Critical Elements of Regime Creation

From this overview, a number of critical elements needed for the successful creation and maintenance of any given regime have been isolated.

International Water Law, which is based on the *Helsinki Rules* and the *United Nations Convention on the Non-Navigational Uses of International Watercourses*, provides the normative basis for agreements in international river basins. These norms have been used in the *SADC Protocol on Shared Watercourse Systems* (and its amendment the *Revised Protocol on Shared Watercourses*) amongst others. Key elements of this include:

(a) Normative values such as the equitable and reasonable use of water resources.
(b) Institutional development including a dispute resolution structure.
(c) The generation of basin-wide technical data needed to manage an international river basin, and the sharing of that data between all affected parties.

The *Rio Declaration* and *Dublin Statement* are a manifestation of reflexivity with respect to the management of all matters impacting on the environment, and these also provide normative elements that are appropriate to regime creation. Key elements of this include:

(a) The mobilization of appropriate scientific knowledge that is open to all affected parties.
(b) The principle of subsidiarity and the broadest participation in the management of water resources, which should be decentralized and accessible.
(c) The management of international river basins as an ecological and hydrological entity, implying that the data and knowledge needed to attain this objective must be institutionalized and made available for all affected role-players to use.

The *World Water Vision* recognizes that institutional reform is one of the main challenges in the quest for sustainable water resource management, and it provides more concrete elements of regime creation. These include:

(a) The reform of existing water management institutions in such a way as to meet the subsidiarity requirements of the *Rio Declaration* and the *Dublin Statement*.
(b) The generation and exchange of uncontested data as a confidence-building mechanism.
(c) Efforts towards the development of a common understanding of the problems within any given international river basin.

(d) The negotiation of agreements between all affected role-players in what can effectively be called water regimes (although such terminology is not actually used in the *World Water Vision* text).
(e) The development of a dedicated conflict resolution mechanism as part of the institutional arrangements that will be needed to manage shared water resources.

The *World Commission on Dams Report* is a consensus document that contains a number of critical elements for regime creation in international river basins. These include:

(a) Broad participation in the management of water resources using the principle of subsidiarity.
(b) The informed consent of all affected parties, including the informed decision-making needed to determine what options are available. Central to this is the role played by data, which becomes the foundation of informed consent.
(c) Conflict mitigation through dialogue and the use of sanctions for the non-compliance of agreements.
(d) The development of a formalized dispute resolution structure.
(e) A critically important paradigm shift away from one of national self-interest (which has a zero-sum outcome) to one of mutual self-interest (which has a plus-sum outcome).

An assessment of the work that has been done by six independent authors (Haftendorn, 2000; Ostrom, 1990; Jägerskog, 2001; Jägerskog, 2002; Haas, 1983; Abernethy, 2001; Krasner, 1983) and others (Pinheiro *et al.,* 2003) has revealed that the critical elements of regime creation include:

(a) A set of uncontested and legitimate rules and procedures.
(b) The observance of those rules and the enforcement of sanction for non-compliance.
(c) The reduction of transaction costs through the acceptance and application of those rules.
(d) Shared knowledge that is detailed and accurate.
(e) Institutional growth and development is incremental in nature, and is usually specific to a given social, political and environmental setting. This means that there is no universal model that can be applied.

(f) Institutions are capable of learning and generating knowledge that is appropriate and synergistic.
(g) A shared understanding of the problem being confronted by all role-players is essential, and comes with the growth of institutional knowledge.
(h) The existence of social capital that is needed to negotiate agreements, generate consensus and choose appropriate institutional models and procedures.

From this wide range of views, it can be concluded that there are three critical elements of regime creation, which can be found in almost all of the literature, even if the terminology used differs slightly. These are:

(a) A common set of rules and procedures that are mutually acceptable to all of the affected role-players, because this promotes plus-sum outcomes and creates the normative foundation for future cooperation.

(b) Hydrological data, to be agreed upon and accepted by all the role-players, as a basis for building confidence and fostering the culture of cooperation.

(c) A conflict management mechanism in order to address the naturally existing conflict potential that is inherent in basin closure, thereby preventing such conflict from escalating into an issue of national security proportions.

3.4 The Necessary Conditions for Regime Creation

> "Social adaptive capacity has been identified ... as the main bottleneck to matching water availability to socially, economically and environmentally sound water management" (Allan, 2000:90).

A number of critical elements to regime creation have been isolated in this literature overview. Given the general absence of water regimes globally (with a few isolated exceptions), the creation of a regime is not an inevitability in all cases. This suggests that specific impediments exist, which can either prevent a regime from evolving, or can hinder the development of a regime once it has been initially created. This indicates the existence of a highly nuanced set of pre-conditions if regime creation is to occur at all. The key focal point of this overview therefore centres on the existence of second-order

resources as a necessary condition for the creation of a regime in an international river basin.

3.4.1 Introduction

In the previous section it has been shown that regimes are an effective way to manage basin closure, largely because this approach institutionalizes the conflict potential and reduces uncertainty for all role-players. This builds confidence and mitigates against an uncontrolled escalation in the development of dams and related hydraulic infrastructure in international river basins, thereby transforming the potential zero-sum outcome of basin closure into a plus-sum outcome. Ostrom (1990:184) has shown that one of the elements that exists in successful agreements to manage common pool resources is what she calls social capital. In similar vein, Falkenmark's (1986:197) concept of the water barrier that was introduced in the Jordan River case study assumes that technological development will be able to manage the problems arising from water scarcity. As such, a threshold (both in terms of water scarcity and the level of technology needed) is assumed to exist beyond which no further socioeconomic development can take place. This is central to the concept of the water barrier scale (WBS) and water scarcity index (WSI) that both form an intrinsic part of Falkenmark's logic (Falkenmark, 1986:197; 1989b:116). It is therefore necessary to develop a deeper understanding of what social capital - that which Ohlsson (1998; 1999) calls adaptive capacity; what Homer-Dixon (2000) calls ingenuity; and what can collectively be called second-order resources - might comprise in the management of a closing international river basin.

3.4.2 The Implications of Basin Closure on Water Management Institutions

Working on the development of the concept of basin closure, and in particular the changing institutional arrangements that are needed to manage this condition, Molden *et al* (2001:73-87 - also see Molden & Merrey, 2002:148) have developed a useful model. This model, referred to hereafter as the Molden Model, shows what happens as the water resources within a given river basin are developed for economic use over time. Their central hypothesis is that changing patterns of water use within a given river basin require what they call "adaptive institutions", for the sustainable, equitable and productive management of water resources. Central to this model, are a number of key concepts that need to be understood.

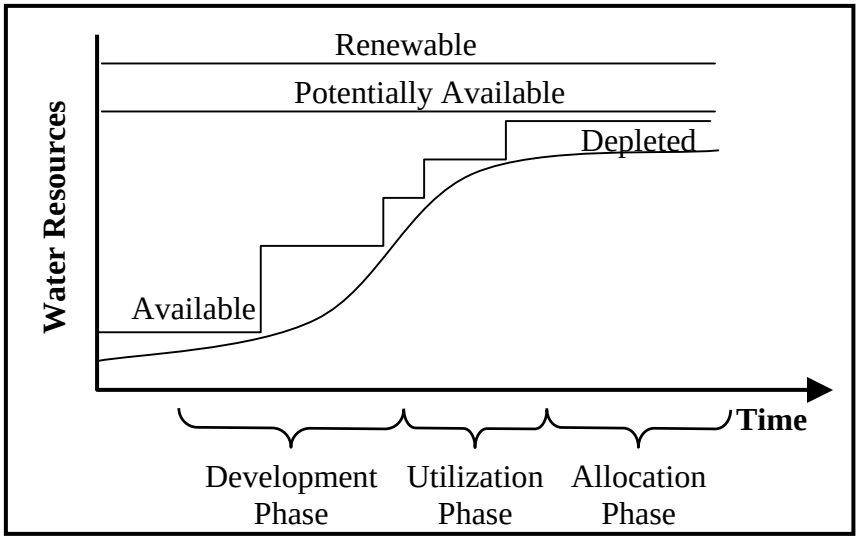
The renewable water resource within a given river basin consists of the total volume of water flowing into that specific watershed. This comes from a variety of sources such as precipitation, groundwater discharge and surface water flows (see Figure 7 - the horizontal line labeled “Renewable”). In essence, this represents the total water resource-base that exists within any given river basin under natural conditions.

The potentially available water is less than the renewable water resource-base, and consists of the water that is available for depletive use within the given river basin. From a purely technical perspective this consists of the gross inflow into the river basin, minus non-utilizable flows (such as those needed for instream flow requirement (IFR) in order to maintain the ecological integrity of the river) minus any agreed water commitments that must be met (e.g. for downstream users) (see Figure 7 - the horizontal line labeled “Potentially Available”).

Available water is a function of the existing hydraulic infrastructure within a given river basin at any moment in historic time. In purely technical terms this consists of the nett inflow, minus the amount of water that has been set-aside for committed uses, minus the non-utilizable uncommitted outflow. In essence, this is the amount of water that is available for use within the river basin in terms of the various assurances of supply design parameters, which have been determined by the hydraulic mission of the state. This changes over time as the water resources are developed (see Figure 7 - the stepped line labeled “Available”).

Depleted water is the use or removal of water from a given river basin that renders it unavailable for further use within that basin. Water is not really consumed, which is one of the unique characteristics of this particular resource, because it is usually returned to the hydrological cycle in some form or other after having been used. This can be in the form of useable return flows from irrigation systems, industrial or domestic return flows, or returns to the atmosphere as water vapour through the stomata of plants, which are not useable in an immediate sense of the word, but which are available elsewhere as part of the global hydrological cycle. Consequently, Molden *et al* (2001) prefer to use the term “depleted water” in their specific model, as this indicates water that is no longer directly available for economic use (see Figure 7 - the “S” shaped curve labeled “Depleted”).

Figure 7. The Molden Model.



Source: Redrawn from Molden *et al.*, 2001:77 and Molden & Merrey, 2002:148.

As water demand increases, there is an impulse to develop more of the available water resource-base within any given river basin. As more water is made available however, more water is also depleted. There is consequently a correlation between available water and depleted water, with the former being represented as a series of steps, which increase as each new dam comes on line. The latter is represented as an "S" shaped curve. Over time, as more of the water resources are developed in response to the growing demand, the depleted water curve approaches the available water curve, necessitating the development of a new hydraulic structure such as a dam. In highly developed river basins, the depleted curve approaches the potentially available supplies. In a closed river basin, the depleted curve approaches (or even exceeds) the potentially available curve. The potentially available water represents the maximum water resource-base that can be mobilized in a sustainable manner, unless other water is brought into the system by means of an IBT. This condition is equivalent to a frontier production function in the field of economics (Molden *et al.*, 2001:77).

As the water resources are developed over time, the institutional arrangements needed to manage those resources also change. According to Molden *et al* (2001:77-78) three distinct phases of institutional development can be isolated (see Figure 7), each associated with a specific level of resource development, and consequently each needing

a different set of rules, procedures and management priorities. These three phases consist of the following:

The development phase: This phase is found in the early stages of river basin development. During this phase, there is no scarcity of naturally occurring water, so the main emphasis is on developing the resources that exist in nature. Due to the abundant availability of water, the laws of economics dictate that it is not a scarce good and consequently the value is relatively low. Growing demand for water results in increased development of hydraulic infrastructure such as dams and pipelines. This starts to place an economic cost on water, but in general the economic value stays low due to its relative abundance. Institutional priorities at this stage are centered mainly on engineering-related issues.

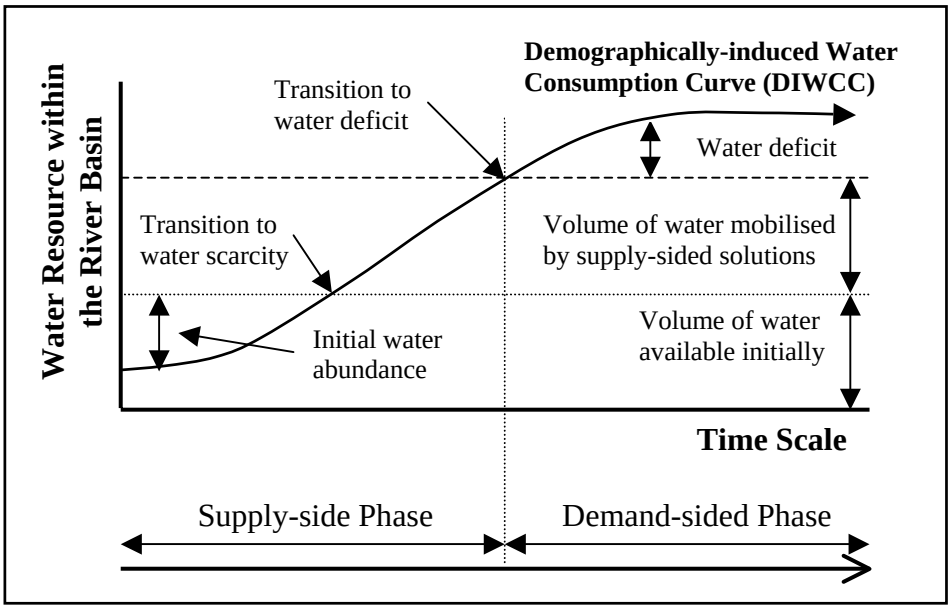
The utilization phase: This phase starts to occur once there has already been significant development of the hydraulic infrastructure. As such there has been considerable economic cost involved in mobilizing water and guaranteeing the assurance of supply to a given level. In this phase efficiency starts to become an issue, so the institutional arrangement changes to adapt to this new management requirement. The institutions tend to focus on sectoral issues such as the management of irrigation projects or the supply of bulk water to domestic or industrial users. Scarcity is not yet a major problem, but the economic cost of water delivery starts to become a concern. Small new infrastructural projects are also developed as the depletion curve approaches the available curve, but these are less attractive and more costly for various engineering-related reasons, so their improved yield is rather limited. In a sense this is roughly like the economic law of diminishing returns.

The allocation phase: This phase starts to become relevant as basin closure is being reached, and depletion approaches the potentially available water curve. This means that there is limited scope for new infrastructural development, so increased efforts need to be made to increase the productive use of the water. The increasing scarcity of water means that the economic laws of supply and demand start to operate and the value of water rises. At this stage allocative efficiency (SWE) becomes an issue, with the need to start inter-sectoral allocation from lower sectoral value users to higher sectoral value users. Managing the demand for water also starts to become a central issue. The institutional focus now changes to the allocation of water between competing users and sectors, the resolution of conflict that now becomes endemic within the river basin, and the regulation

of water supply. Coordination becomes increasingly important involving significant transaction costs. The apportionment of water to different riparian states becomes a key issue in international river basins at this time.

While the Molden Model is helpful in showing how institutional arrangements within a given river basin need to change over time, it does not cast enough light on some important conceptual issues. In response, this author has engaged in some research work with the purpose of developing a more comprehensive model - referred to hereafter as the Turton/Ohlsson Model (see Figure 8) (Turton, 1999; Turton & Ohlsson, 1999). Central to this work is the need to understand the various transitions that are implicit in the Molden Model.

Figure 8. The Turton/Ohlsson Model.



Source: Redrawn from Turton 1999; Turton & Ohlsson 1999; and Turton & Meissner 2002:46.

This refined model, although similar to the Molden Model, was developed independently. The central need is to understand what social triggers, if any, are important for institutional development as the various phases of water resource management are encountered over time. As such the identification of thresholds is important, as these trigger off a new set of institutional needs, which if not met, could result in an increase in conflict potential and a delegitimization of the institution. The Turton/Ohlsson Model is based on the assumption that it is largely demographic factors that drive the demand for

water in a given river basin (see Figure 8 - the "S" shaped curve labeled "Demographically-induced Water Consumption Curve (DIWCC)"). The Turton/Ohlsson Model is based on five assumptions (Turton, 1999; Turton & Ohlsson, 1999).

(a) As the demographic base of a given river basin changes over time, there is an increase in the demand for water. In this sense there is a close correlation between demographic growth and the growth in water demand. As a result, the main curve on the graph is called the "Demographically-induced Water Consumption Curve" (DIWCC). The word "consumption" is used loosely in the sense that water is used but not really consumed as one would consume a resource like coal, which once "consumed" would no longer be available for burning as an energy source. Water is "consumed" but returned to the hydrological cycle in some form or either, either as effluent or as water vapour. The important aspect is that this water is not readily available for direct re-use, so in a loose sense it has been "consumed". In reality effluent can be treated, but this adds cost and is normally beyond the capacity of most developing countries to do, resulting in pollution as a significant element in the depletion of a resource-base. Lundqvist (1998) has labeled this phenomenon "hydrocide", which is a manifestation of a specific - and particularly debilitating - second-order resource problem for the developing world in general.

(b) During the early stages of development within the given river basin, there is an initial period of water abundance. Under such conditions, demand is relatively low, water availability is relatively high and consequently water has a low economic value. This in turn means that the incentive for the abuse of water is high during the early stages of river basin development.

(c) Economic development takes place, very often having been triggered off by a specific event such as the discovery of gold on the Witwatersrand, which in turn creates a rapid increase in the demand for water (Turton & Meissner, 2002:39). This forces the DIWCC upwards, to a point where it crosses the horizontal line that represents the volume of water that was available initially. This corresponds to the Potentially Available line on the Molden Model (see Figure 7). This juncture refers to a specific moment in time known as the transition to water scarcity.

(d) Water scarcity exists within the given river basin when the DIWCC exceeds the locally available supply of water. The transition to water scarcity results in the development of the hydraulic mission in society, as politicians seek to mobilize water in

order to create a stable infrastructural platform on which future social and economic development can be built. Engineers are commissioned with the task of mobilizing water by means of the development of hydraulic infrastructure. This corresponds with the stepped "Available" curve on the Molden Model (see Figure 7). Institutional development that has been created by the transition to water scarcity is similar to the development and utilization phases of water resource management previously depicted (see Figure 7). Basin closure is approached, and possibly even reached in this phase of water scarcity. If basin closure is reached, then there is a strong stimulus to augment supply within the given river basin by capturing the resource-base in an adjacent river basin by means of an IBT. This increases the volume of water that can be mobilized though human ingenuity, thereby enabling water supply to continue even after basin closure has been reached. This acts as a primary stimulus for resource capture, with direct implications for other downstream riparian states in international river basins. This important element of water resource management is not evident in the Molden Model, which presumes that water is managed within the context of a given river basin with no linkage to other river basins, placing it at odds with the South African reality (see Chapters 4 & 5).

(e) Continued economic development causes water to be mobilized to such an extent that the DIWCC starts to approach, and eventually passes, the maximum volume of water that can be mobilized by a supply-sided management approach such as an IBT. This represents the transition to water deficit, beyond which no further water can be mobilized without severe long-term ecological implications. Under these conditions water can become securitized as the strategic implications of water as a fundamental component of the economic growth potential of the state become apparent. Institutional development in this phase is centered on water allocation, conflict resolution and the management of demand, with specific implications for other riparian states in international river basins, given the potential impact that resource capture has had on their own resource-base.

3.4.3 Adaptation as a Result of Second-Order Resources

Haas (1983:57) notes that organizations can learn and adapt, which is accomplished through the processing of information and the development of institutionalized knowledge (as defined in Chapter 1). As such, knowledge creates the basis for cooperation by illuminating complex interconnections that were not previously

understood (Krasner, 1983:19). Knowledge is therefore a function of cooperation, which in turn is the foundation of adaptation. As Horta (2000:196) notes,

> "Ultimately, the internal dynamics of institutions determine to a large degree how institutions will pursue a new set of goals and how these will become incorporated into institutional practice. … [T]hese theories make an important distinction between organizational adaptation and learning. While the latter leads to the adoption of qualitatively new objectives and priorities, the former involves changes brought about by new pressures or incentives, but without adjustments in the organization's underlying goals and priorities."

So institutionalized knowledge, learning and adaptation are closely linked, but are also different from each other. A critical element of both the Molden Model and the Turton/Ohlsson Model is the central role that adaptation plays within any institutional arrangement for water management in a closing river basin. The weakness of both these models is that they assume that adaptation will occur, without explaining what the specific elements of adaptation are. According to Allan (2000:323), this is where the work by Ohlsson (1998; 1999) becomes highly relevant. Ohlsson (1999:5; 23-24) was initially concerned about the Malthusian-related issues of abundance and scarcity, seen within the context of natural resources and this linkage to human populations. Central to Ohlsson's argument is the existence of three distinct forms of scarcity. These are the *scarcity of non-renewable resources* such as minerals; the *scarcity of renewable resources* such as water that are used for the production of biomass and food; and the *scarcity of social resources* that will be needed by societies to adapt to changing levels of renewable and non-renewable resource scarcity.

These three forms of resource scarcity have major significance for explaining and predicting the institutional adaptation that is assumed by both the Molden Model and the Turton/Ohlsson Model. Focusing on environmental scarcity as a potential cause of conflict, Ohlsson (1999:47-48) notes that there are five conditions that may result in open violence. These are:

- Trapped development occurs when depleted resources cannot be substituted in the foreseeable future, which place social groups that are dependent on that resource-base for their survival in a desperate situation. In this case conflict is precipitated by the lack of viable options and the polarization of society.

- The lack of social regulatory mechanisms is a sign of the social and political powerlessness of both traditional and modern institutions of the state and civil society. In this regard the "powerlessness of power" occurs when a political system is unable to detract itself from certain social and political conditions, and developmental goals such as sustainability become impossible to attain. Open conflict becomes more endemic as social institutions fail to manage the rising levels of discord. Seen in this light, sustainability becomes intimately linked with the adaptive capacity of society.

- The environment becomes instrumentalized when certain powerful groups in society manage to manipulate the environmental scarcity in such a way that the resource scarcity becomes transformed into a group identity issue. In this regard trans-boundary rivers are easy to instrumentalize as a means of applying political pressure. Opposition groups start to use ecological crises to articulate their criticism of the state, and marginalized groups are used to attain specific political objectives.

- The organizational ability, and opportunity to become armed, increases as the environmental conflict escalates. This on its own does not precipitate violence, but when it coincides with social and political cleavage lines, it enhances the conflict potential that is inherent within such societies.

- The overlay of historic conflict patterns becomes more relevant as environmental scarcities become a factor. For violence to occur, the adaptive capacity of society in general, and the state in particular, becomes highly relevant under these conditions.

It must be noted that social adaptation - or more accurately stated, the lack of appropriate social adaptation - is a central feature of many of these conflict patterns. Reviewing the Rwanda genocide as a case study of environmentally-induced conflict, Ohlsson (1999:148) concludes that,

> "Now, judging from the developments in the field, the time for such a reconceptualization is ripe, whether practitioners are clear about what they are really doing, and whether social scientists studying the process

> recognize what is happening or not. As an example, water managers in water scarce countries have gone through an early phase of scrambling for more water, mainly with technical and engineering means (attempting to *overcome* scarcity), only to be forced into learning how to live with scarcity; first by saving water (attempting to *manage* scarcity); then increasingly by finding better uses for the limited available resource (attempting *adaptation* to scarcity); in the process being forced to deal with a number of difficult problems occasioned by the social and economic structural change necessitated (thus encountering the *social resource scarcity* sought for here (emphasis in original text)."

This has led Ohlsson (1999:161) to distinguish between two specific types of resource that are relevant to this analysis of resource scarcity. These are as follows:

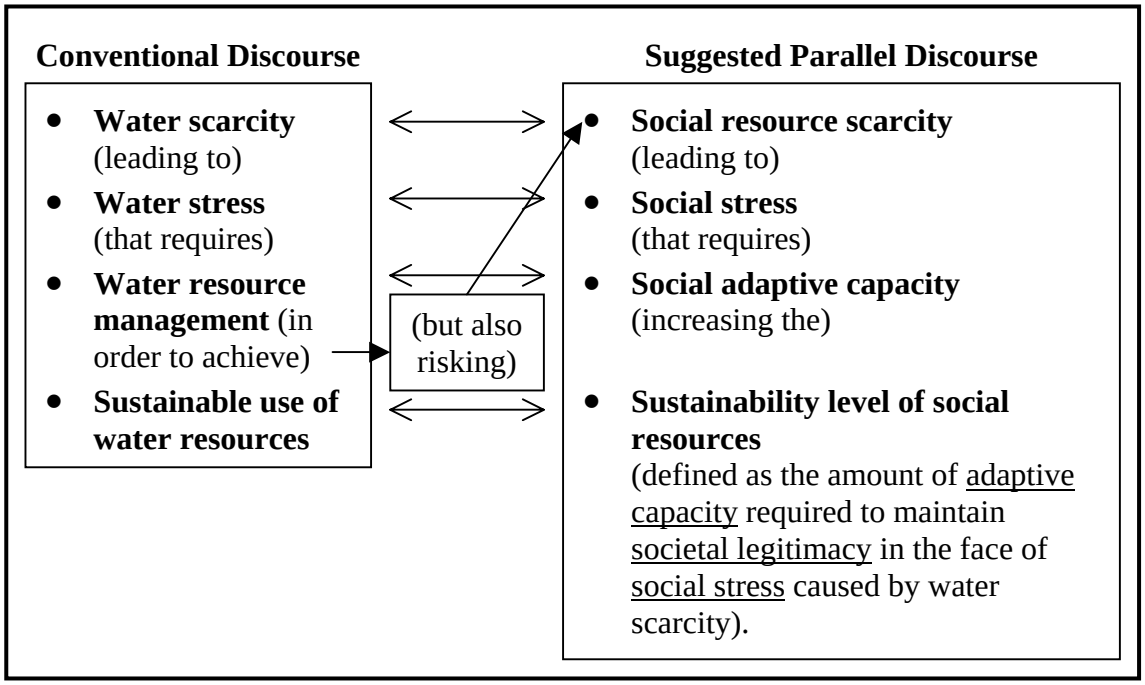
A first-order resource: This is a natural resource such as minerals, land and water, which may be scarce or abundantly available. There are also two distinct types of first-order resource, namely non-renewable and renewable resources, each with fundamentally different characteristics:

> (a) *Non-renewable resources* have a finite availability, exist in the form of a *stock*, and once depleted cannot be replaced. A characteristic of these resources is that they are *consumed*, which is an irreversible process. Typically, consumption of these resources results in a whole series of other problems such as pollution and environmental deterioration, so the management of the resource needs to factor this in.
>
> (b) *Renewable resources* have infinite availability, exist in the form of a *flux*, are not depleted and therefore are *not consumed*. Consequently, effective management of these resources can result in continued economic growth over time. The operative word therefore becomes "effective management", establishing a linkage to second-order resources.

A second-order resource: This is a social resource, which may be either scarce or abundantly available. More appropriately, it is the type of resource that is needed for effectively dealing with first-order resource scarcities. Seen in this light, the failure to mobilize the appropriate amount of social resources with which to accomplish institutional transformation and change, must be seen as a special form of resource scarcity.

In this respect, Ohlsson (1999) has identified two different discourses on resource scarcity, which is called Ohlsson's Parallel Discourse of Scarcity hereafter (see Figure 9). This work represents a substantial shift forward in the way that water resource management can be explained and understood. These assumptions are subsequently developed further in the Turton/Ohlsson Model (see Figure 8). If Ohlsson's (1998; 1999) work is valid, then there are essentially three phases to water resource management, and consequently three specific focal points of water policy, each necessitating a different institutional arrangement.

Figure 9. Ohlsson's Parallel Discourse of Scarcity.



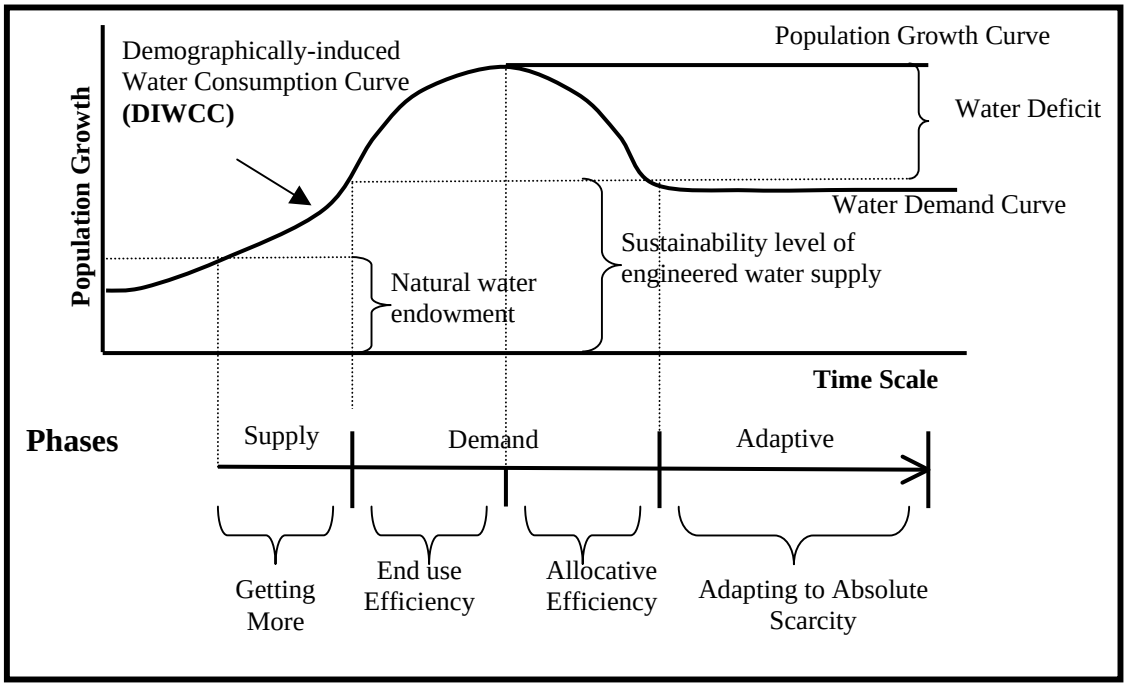
Source: Redrawn from Ohlsson 1999:164.

Using the same concepts as the Turton/Ohlsson Model, the assumption was made that water deficit is an unsustainable condition, much like an overdrawn bank account or balance of payment deficit in economic terms. Consequently, if water demand continues above the level of water mobilized by supply-sided solutions (roughly equivalent to the "Available" curve in Figure 7), then ecological collapse is likely. This would become a classic type of threshold event, heralding in a non-linear collapse of economies and the social systems that they support. To use Homer-Dixon's (2000:173) terminology, "greater complexity … and a higher chance of nonlinearities tend to boost the number of

unknown unknowns in the natural, social, and technological systems around us". If this condition were to be averted, then any policy choice would have to involve the decision to re-align the DIWCC with the sustainability level of engineered water supply shown in Figure 10. This would change the shape of the "S" curve, and would split the water demand curve from the population growth curve (Ashton & Haasbroek, 2002:197).

In technical terms this is called reflexivity (Allan, 2000:29; Beck, 1992; Beck, 1995; Beck, 1996a; Beck, 1996b; Giddens, 1990). Reflexivity in turn constitutes an empirically verifiable indicator of the effectiveness of water policy as an output of any given institutional arrangement, because it shows the ability of the management unit to reduce the deficit and realign the demand for water with the sustainable levels of supply. In other words, the change in trajectory of the water demand curve is the result of effective adaptation and institutional learning. Using the economic analogy previously alluded to, reflexivity is like paying back the bank overdraft before the point of bankruptcy is reached, or reducing the national balance of payments deficit before the whole economy stagnates. Reflexivity therefore enables the "unknown unknowns" - to use Homer-Dixon's (2000:173) terminology - that are associated with the threshold effect to be avoided before they occur.

Figure 10. The Reflexive Model.



Source: Redrawn from Turton 2000a; Ashton & Haasbroek 2002:197.

Based on this, a more sophisticated model is developed - hereafter referred to as the Reflexive Model (see Figure 10) - that contains three distinct phases of water resource management, namely the supply-sided phase, the demand management phase and the adaptive phase.

The supply-sided phase of water resource management starts when the DIWCC crosses the first threshold from water abundance into water scarcity. This acts as a stimulus for the hydraulic mission of society, which goes by different names in different parts of the world. Reisner (1993) coined the term hydraulic mission when describing the US experience at mobilizing water in order to settle the arid West. Breznhev (1978) describes a similar occurrence in the former USSR. Swyngedouw (1999a; 1999b) has used it in his study of the mobilization of water in the modernization of Spain. Platt (1999) refers to this as the phase of "heroic engineering" in the mobilization of water resources for the development of the Boston and New York metropolitan areas. This is what Waterbury (1979:116) refers to as the "High Dam Covenant" in the case of the Nile and the construction of the Aswan High Dam as a foundation for economic modernization in Egypt. Allan (2000:28) notes that the hydraulic mission is essentially a feature of modernity, which is a term used to describe the processes of change in the industrialized North during the nineteenth and twentieth centuries.

The demand management phase starts when the DIWCC crosses the second transition from water scarcity to water deficit. In reality this consists of two distinct sub-phases, namely an early and an advanced phase.

(a) *The early phase* is about end-use efficiency, where intra-sectoral allocative efficiency occurs at the level of the production unit away from water-related activities that yield a low return to water, towards productive activities that show a higher return to water. This is not too complex to manage as it involves limited social disruption and is thus preferred by politicians (Turton & Ohlsson, 1999; Allan, 2000:184).

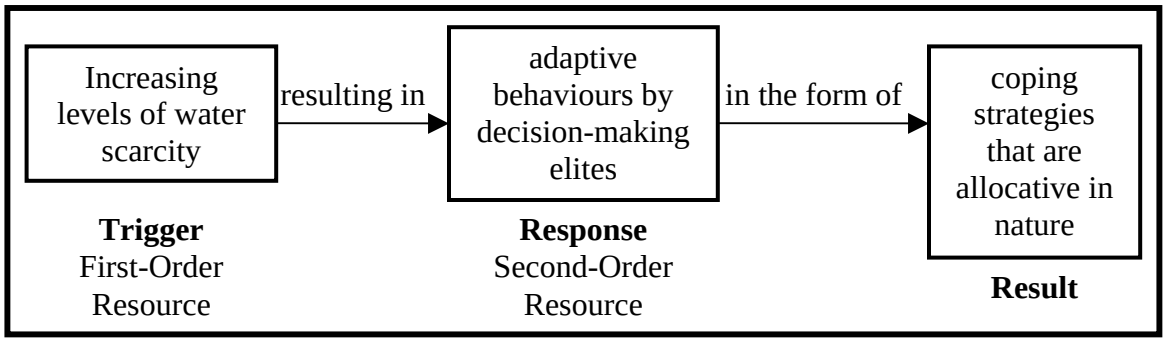
(b) *The advanced phase* is about allocative efficiency, and in particular inter-sectoral allocative efficiency, where water is moved away from economic sectors involving a low return to water (typically agriculture), towards economic sectors showing a higher return to water (typically industry). This is highly disruptive in social terms, and consequently tends to be avoided by politicians, but is necessary

if a reflexive response is to be achieved in the long-term (Turton & Ohlsson, 1999; Allan, 2000:184).

The adaptive phase occurs when the social entity concerned needs to learn how to live with absolute scarcity and still manage to survive in a rapidly globalizing economy where efficiencies of production are important. This is a difficult phase of water resource management because it implies that economic growth and social stability will need to be managed in the face of endemic and debilitating water deficit. It also means that the complexity related to the management of the environmental problems that result after first-order resource depletion has occurred (arising from the threshold effect) would need to become part of the institutional objectives. In the water sector this includes issues such as the acid mine drainage that occurs after exhausted gold mines flood and decant their toxic waters into streams, which is currently happening in parts of Gauteng Province and elsewhere in the SADC region. In international river basins this also includes managing the thorny issue of riparian relations and water allocations between the various riparian states in a way that prevents the securitization of the dwindling water resource-base.

It is therefore evident that adaptation, which involves institutional learning, is really a key concern for sustainable water resource management, as suggested by the Molden Model. In fact, it can now be deduced that changes in the first-order resource availability trigger responses that are needed to manage those changes. These responses are second-order resource dependent (see Figure 11). There is thus an intimate link between first-order and second-order resources that is not evident in the Molden Model, which needs to be explored further.

Figure 11. The Linkages between First-order and Second-order Resources.



Source: Redrawn from Turton & Ohlsson 1999.

There are consequently a number of great challenges facing water policy-makers in countries where water scarcity is a major factor determining the economic growth potential of the state. Ohlsson (1999:189) has identified three generic challenges, namely the management of conflict; getting more use out of the same volume of water; and making better use of the available water. In order to manage these three challenges, he notes that three policy goals are needed. These goals would have to be incorporated into regimes or institutions if they are to function in a sustainable and satisfactory manner over time. These policy goals are as follows:

The management of competing demands for water from different societal sectors and population groups (within a given river basin) in order to achieve a distribution of the scarce resource that is deemed to be equitable. This will require robust institutions capable of withstanding the potentially delegitimizing demands that will be made of them in their quest to mitigate and resolve endemic conflict.

The facilitation of technological changes in order to achieve greater end-use efficiency of existing water, or stated differently, doing more with the available water. This has a first-order resource focus because it seeks to limit the use of water as a resource, and therefore requires a specific form of technical ingenuity (Homer-Dixon, 2000). This is central to Falkenmark's (1986:197; 1990:181) concept of a water barrier that she considers to be relevant to the Jordan River basin.

The facilitation of socioeconomic changes in order to achieve greater allocative efficiency of water, or stated differently, doing alternative things with the available water. This has a second-order resource focus as it seeks to do better things with the available water. Because it involves changes to the fabric of society, such as those caused by the reduction of non-specialized agriculture that is usually performed by unskilled rural dwellers; the increase in mechanized factory farming using fewer unskilled workers; the resultant migration from rural areas to urban areas; and the redeployment of scarce water into the industrial sector, this is a highly complex process that carries considerable political risk. As such it places high demands on the second-order resource base of any given society.

The policy tools that are available in order to reach these policy goals can be divided roughly into two generic groups, namely the *administrative approach* and the *market approach* (Ohlsson, 1999:189). From this Ohlsson develops a matrix linking the water

policy goals with the available tools (see Table 14). Significantly, it is the development of appropriate institutional arrangements, and the generation of viable coping strategies in the form of policies, that lie at the heart of the water management dilemma. It is these very issues that are also second-order resource dependent, so the first-order resource focus inherent in most water scarcity narratives - such as the story being told about rivers running dry - is overly simplistic and deeply flawed (Ohlsson & Lundqvist, 2000).

Table 14. Matrix Showing Water Policy Goals and Available Tools.

Goals (right): Tools (down):	Equitable Distribution	End-use efficiency	Allocative efficiency
Administrative Approach	Recommended but not necessarily the best	Clumsy but probably still necessary	Government faces tough decisions
Market Approach	Needs administrative measures as well	Getting the prices right is difficult	Markets can be cruel decision-makers

Source: Redrawn from Ohlsson 1999:189.

From this literature overview it is evident that the problems confronting institutions because of basin closure are extremely complex indeed. This complexity is a mixture of both a first-order resource scarcity (water deficit), and a second-order resource scarcity (inability to reform or adapt institutions effectively) that cannot be understood in terms of a linear model.

3.4.4 The "Turning of a Screw" Model

The *problematique* arising from this complexity has resulted in research, which has shown that it is best understood in terms of a series of bottlenecks or oscillations between first-order and second-order resources. This can be likened to the turning of a screw in which there is a form of non-linear progression between identifying bottlenecks in water resource management; finding and mobilizing the appropriate social tools to meet the challenges as they arise; and dealing with the conflicts that are being created by the new adaptive ways in which water resources are being managed (Ohlsson & Turton, 1999; Ohlsson & Lundqvist, 2000).

This progression oscillates in a non-linear fashion, between a perceived scarcity of water (first-order resource), and a perceived scarcity of the social means needed (second-order resource) to overcome this initial first-order water scarcity, all the while spiraling upwards because increasing amounts of social resources need to be mobilized as water deficit becomes endemic. The task of managing this oscillation is about the process of learning, preferably within the context of an institution, how to effectively deal with, firstly the *conflicts encountered as a result of the water scarcity* (first-order focus), including those within both the international and domestic political environments; and secondly the *conflicts encountered as a result of the social resources applied to overcome this natural resource scarcity* (second-order focus), including conflicts that are aimed at reducing state legitimacy.

It can therefore be seen that there is a shift in emphasis over time, from managing first-order resource problems (getting more water) initially, and ultimately managing second-order resource problems (managing water allocation between riparian states and doing better things with the available water). These correspond to the three water management phases indicated in the Reflexive Model (see Figure 10). Details of some of these issues are as follows (Ohlsson & Turton, 1999; Ohlsson & Lundqvist, 2000):

During the *supply-sided phase* the problem is perceived as water scarcity. The logical solution is therefore to build hydraulic infrastructure and mobilize water as part of the hydraulic mission of society. This is entirely first-order in focus, but second-order issues arise in the form of conflict over access to the water resource being mobilized - the so-called “pipelines of power” thesis in which hydropolitical privilege is not evenly spread throughout society - in water scarce regions (Turton, 2000b). Other issues focus on conflict between people who are displaced by the dam-building projects and the government, and conflict between riparian states within an international river basin, which usually results in a zero-sum outcome inherent in the upstream/downstream hydropolitical game - sometimes called the “Rambo option” (Ohlsson & Lundqvist, 2000).

During the *demand management phase*, the problem becomes more complex because it is essentially about doing more in economic terms, with less available water. Sustainability is at stake and very little new water can be mobilized due to basin closure, so the perception of the problem changes from the management of water supply (water as a first-order resource issue), to the management of demand (institutional measures such as

water demand management (WDM) as a second-order resource issue). Central to this is the transformation of the management of water as an absolute scarcity, to one of a relative scarcity that can be managed provided that society is prepared to pay the necessary price in social and economic terms. This results in a new emphasis being placed on second-order problems - what Edward Tenner (1996 cited by Homer-Dixon (2000:178) calls revenge effects - such as conflict:

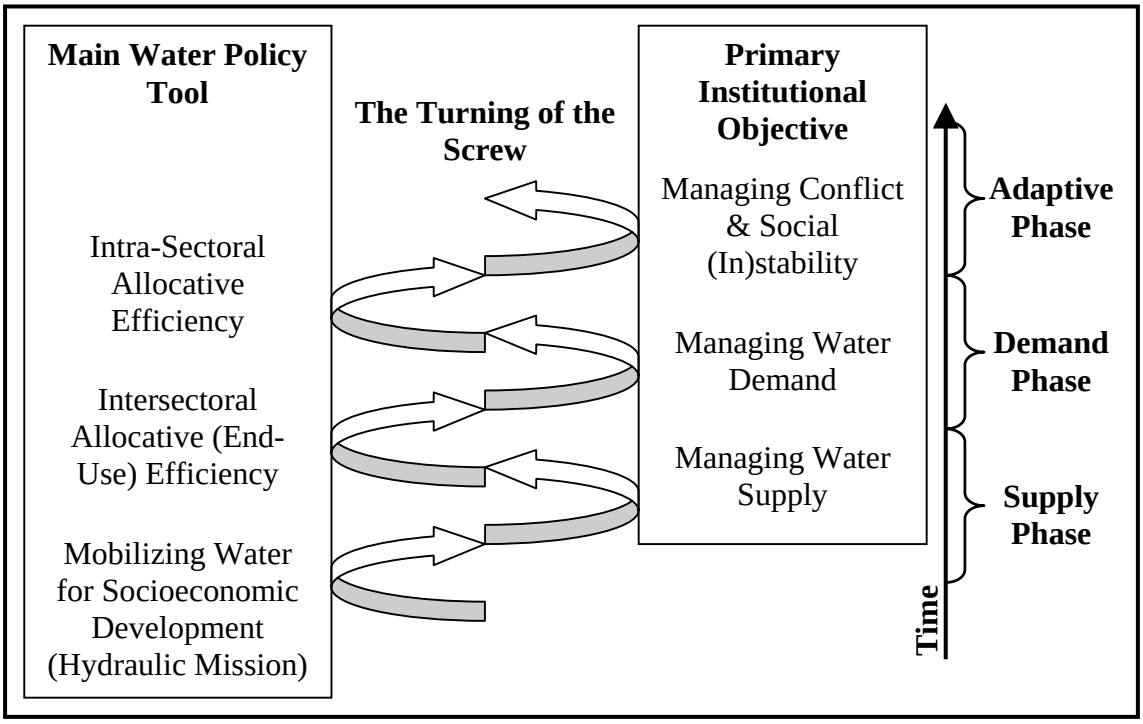
- arising from the changes in rules, norms and administrative procedures, which change the pattern of hydropolitical privilege that have become the norm in society;
- arising over the metering of water to previously non-metered users who have grown accustomed to free water;
- arising when people have to start paying full cost recovery level tariffs for their water services;
- arising from displaced farmers as the shift to water-saving technology forces already marginalized people off the land;
- between rural and urban users of water;
- between riparian states in international river basins, especially where one country is more developed than another and has consequently already mobilized the majority of the water;
- and between economic sectors, as sectoral water efficiency (SWE) issues become more relevant.

During the *adaptive phase*, the problem is extremely complex, as it is about doing alternate and even-more economically productive things with the now highly scarce, probably polluted and very expensive available water. This involves a major emphasis-shift towards second-order issues. This in turn unleashes a new series of revenge effect-styled second-order problems, which come in the form of conflicts:

- arising from the restructuring of society, away from an agrarian-based economy, to an industrially based economy;
- arising from rural/urban migrations and the increase in slums around large metropolitan areas;
- arising from increasing levels of crime, as the rapidly urbanizing work force is unable to gain full employment due to inadequate education levels, and the effects of economic stagnation;

- between riparian states over the allocation of water in international river basins;
- arising from new political and economic dependencies, that arise from the need to balance local water deficits, by importing virtual water from the global grain market;
- and arising from economic marginalization, as the developing country battles to integrate into the global economy, because the nett outflow of hard currency needed to achieve food security through the importation of virtual water becomes inflationary.

Figure 12. The "Turning of the Screw" Model.



Source: Adapted from Ohlsson & Turton 1999 and Ohlsson & Lundqvist 2000.

The oscillations within the "Turning of the Screw" Model can be visually depicted as a spiral (see Figure 12). The left-hand column shows the main policy tool that is used in each of the water management phases. The right-hand column shows the primary institutional objective for each of the water management phases, as initially defined in the Reflexive Model (see Figure 10), which are shown on the time-line at the extreme right of the diagram. The oscillations between first-order resource and second-order resource

priorities are depicted as the "turning of the screw" between the main policy tool and the primary institutional objective columns.

It is instructive to summarize the argument for the importance of second-order resources that has been developed so far. Having noted that adaptive management is needed in the water sector from the Molden Model, the connection between institutional learning and the various phases of water resource management over time have been explored (Turton, 1999; Turton & Ohlsson, 1999). The "Turning of the Screw" Model has shown that there is an intimate linkage between first-order resources and second-order resources, with an oscillation in emphasis between these two types of resource over time. From this it can be concluded that second-order resources, which have been crudely defined as social adaptive capacity, are the actual determinants of social stability in water-scarce states (Ohlsson, 1998; Ohlsson, 1999; Turton, 1999; Turton & Ohlsson, 1999; Turton & Warner, 2002). In support of this, Trottier (1999:134) has shown that this theoretical aspect is valuable in explaining the conditions in the occupied territories of the Jordan River basin, while Brooks *et al* (2002:11) have suggested that these aspects should guide future International Development Research Centre (IDRC) funding.

In his ongoing work on the MENA region in which he has sought to develop an integrated theoretical base for the study of hydropolitics as a unique discipline, Prof. Tony Allan has taken note of the importance of second-order resources, and has said the following about their role in water resource management:

> "Another body of theory developed by Ohlsson & Turton (1999) is useful in explaining why water policy reform is difficult. The theory is also useful in gaining an understanding of the social and political dynamics of water policy reform. … First-order scarcity can occur and worsen when demand rises to outstrip supply. Second-order scarcity can vary according to the pace at which social adaptive capacity can be strengthened. An improvement in social adaptive capacity can compensate for a physical water shortage. An improvement in the volume and quality of water cannot compensate for a shortage in social adaptive capacity in the same measure. … Only when low social adaptive capacity is combined with water deficits is there an intractable situation. An economy need not be significantly hampered by water deficit. … The achievement of a high level of social adaptive capacity is not determined by water availability" (Allan, 2000:322-323).

In the preface to the same work, Allan (2000:xvi) also notes that "[Turton's] work with Leif Ohlsson … is the most cited in the book". Similarly, in a review of thirty-years of IDRC funded projects in the water sector, the authors of the report said:

> "Homer-Dixon has directed the discussion of ingenuity at the macro level and on the importance of ideas and institutions for problem solving. At the micro level however, in the areas of fresh water scarcity and conflict, the research of Ohlsson and Turton has been critical in the shift away from an emphasis on scientific information and technologies. Drawing from, and expanding upon, Homer-Dixon's theory of ingenuity, Ohlsson and Turton have presented an analysis of social responses to complexity. They have developed a framework for how societies diverge in their problem solving of water scarcity and how, potentially, conflict may arise as a result of a shortage of social adaptive capacity" (Brooks *et al.*, 2002: Annexure B3).

Stated differently then, it can be said that second-order resources are an independent variable, because the quality, quantity and timing of the availability of those resources determine the final outcome of basin closure. In other words, if basin closure occurs at a place and time where there is also a low level of social adaptive capacity (i.e. a second-order resource scarcity), then the securitization of water is likely to occur as the conflict potential increases and is transformed into a probable zero-sum outcome. Conversely, if basin closure occurs at a place and time where there is a high level of social adaptive capacity (i.e. a second-order resource abundance), then the conflict potential can be mitigated with a probable plus-sum outcome, as regimes are negotiated, and adaptive institutions are created and maintained. Second-order resources are consequently the independent variable (Turton, 1999; Turton & Ohlsson, 1999; Allan, 2000:322-325; Turton & Warner, 2002:67).

3.4.5 Ingenuity as a Second-order Resource

Having determined that second-order resources are the independent variable, it is now possible to examine these in more detail. In this regard it is instructive to note that, according to the Global Water Partnership:

> "The water crisis is often a crisis of governance: a failure to integrate policies and practices related to the management of water resources. Good water governance exists where government bodies responsible for water establish an effective policy and legal framework to allocate and manage

> water in ways responsive to national social and economic needs, and to [ensure] the long-term sustainability of the resource-base" (GWP, 2000).

Having reached this point, very little has been revealed about what second-order resources actually are, beyond the generic description of why they are needed. Even Ostrom's (1990:184) work merely notes that something which she calls social capital is needed to make common pool resource management effective, without going into details of what this might actually consist of. Fortunately, Thomas Homer-Dixon (1991; 1994; 1995; 1996; 1999; 2000) has done some groundbreaking research into what he calls ingenuity, which will be argued is nothing more than a second-order resource or a form of social capital.

Homer-Dixon develops his argument along the following lines. He starts off by analyzing the concept of a resource, much the same as Ohlsson (1999) did, but with a different emphasis. With respect to environmental resources, and in particular scarcities of those resources, Homer-Dixon (1996:360) identifies three generic forms of scarcity.

Supply-sided scarcity: This occurs when the actual resource-base diminishes over time. This can be thought of as being a smaller sized resource pie. The causes of this could be varied and include periodic drought, which is a natural event; global climate change, which could have an impact on precipitation levels reducing the total volume of water within a river basin; hydrocide[1], which reduces the availability of water through pollution and abuse of the resource (Lundqvist, 1998); and the mobilization and use of water upstream can cause a physical reduction in volumes available downstream, which typically results from basin closure.

Demand-induced scarcity: This occurs when a growing population remains dependent on a finite resource such as land, with a resultant decrease in resource availability *per capita*. This can be thought of as a smaller slice of the overall resource pie and is based on the notion of a finite resource-base such as land. In the water literature, this type of argument is called the "numbers game", which can be traced back to the pioneering work by Falkenmark (1986; 1989b; Ohlsson & Lundqvist, 2000). Postel (1999) bases much of her work on this logic. Ohlsson (1999: 80-144) has found that this form of scarcity (in this case land) acted as a driver for the Rwanda genocide.

[1] This is a form of induced-scarcity that is typically the plight of developing countries using dirty technologies to drive economic growth (Ohlsson & Lundqvist, 2000).

Distributional scarcity: This arises from a growing imbalance between wealth and poverty. This is also known as structural scarcity after resource capture has been implemented by powerful elites in society. The author's "pipelines of power" thesis can be used to explain this phenomenon (Turton, 2000b). The case of apartheid South Africa also falls into this category (Homer-Dixon, 1996:365; Homer-Dixon & Percival, 1996; Percival & Homer-Dixon, 1995; Percival & Homer-Dixon, 1998).

Building on this conceptualization, Homer-Dixon (1996:361) notes that environmental scarcity is not only a consequence of institutions and policy - it can also influence these in a reciprocal manner. The cause-effect linkage is not linear and unidirectional. Therefore, explanations for environmental scarcity should not be subordinated to institutions and policies alone, because it is also partly a result of the physical context in which society is embedded. Consequently, once environmental scarcity becomes irreversible, say through the destruction of topsoil by erosion and poor agricultural practices, and the resultant siltation of dams, then the scarcity becomes an external influence on society. Seen in this light, both institutions and policies are a product of the second-order resources in society.

One of the possible adaptive responses to increasing levels of environmental scarcity is related to technology, where it is argued by Cornucopians - another name for a techno-economic optimist - that rising levels of resource scarcity will become the stimulus for invention. Seen in this way, society will somehow find the remedy when it is needed, because history has shown that necessity is the mother of invention. Refuting this argument as being overly simplistic, Homer-Dixon (1991:101) notes that market-driven adaptation to resource scarcity is most likely to succeed in wealthy societies. It is in these developed countries that sufficient reserves of capital, knowledge and talent help economic actors invent and adapt technologies that result in changes to consumption patterns. He goes on to suggest that this argument is deeply flawed, because the majority of countries that are in fact being confronted by increasing levels of environmental scarcity are developing countries, which are economically poor, with inefficient markets, a lack of financial capital and a paucity of knowledge and know-how. Consequently, the water barrier that Falkenmark (1986:197; 1990:181) speaks of is dependent on second-order resource availability, which Israel has in abundance, but which the Palestinians, Syrians and Jordanians have in varying degrees of scarcity by way of example (Allan, 2000: 324).

When being confronted by increasing levels of resource scarcity, societies can avoid the resultant social disintegration and turmoil (second-order scarcity) if they can adapt to the rising levels of (first-order) scarcity. In this regard, Homer-Dixon (1994:16) notes that adaptive strategies essentially fall into two broad categories. Firstly, societies can continue to rely on their indigenous resources, but use them more sensibly. Economic instruments such as taxation and other incentives could be used to increase the price of resources, thereby encouraging conservation and innovation while reducing depletion. Alternatively, societies might choose to decouple themselves from dependence on their own environmental resources, by producing goods and services that do not rely on those resources. This would involve the reinvestment in capital and skills in order to achieve the shift to other forms of wealth creation.

In order to achieve either of these two options however, what Homer-Dixon (1994:16-17) calls ingenuity will be needed. Central to this concept of ingenuity is the notion of social capital - the same concept that Ostrom (1990; 1994; 2000) utilizes. First used in the English language by Hanifan (1916), there is also a strong French sociological tradition that is mostly associated with the work of Pierre Bourdieu (1986) (Fine, 2001:28-53). Putnam (1993:167-170) notes that social capital includes both the normative values and social networks that can improve the efficiency of society by facilitating coordinated actions. It is these very things that are needed to negotiate and maintain regimes in closing river basins. The significant aspects of social capital are that:

- A reputation for honesty and reliability is an important asset for a would-be participant in a communal venture.
- The reliance on a reputation reduces the uncertainty in the absence of collateral and therefore induces compliant behavior.
- Social networks allow this trust to be spread, and thereby result in confidence-building. Trust is an essential component of social capital.
- Unlike financial capital, social capital increases the more it is used. As such, once it exists, it need never be depleted over time; and if well managed will grow.
- Social capital can therefore be regarded as being a moral resource.
- Like all public goods, social capital is undervalued and under-supplied by private agents.
- Unlike other forms of capital, social capital must be produced as a byproduct of other social activities such as in an institution.

Percival & Homer-Dixon (1998:281) state that environmental scarcity forces groups to focus on narrow survival strategies, which in turn reduce the interactions of civil society within the state. Putnam (1993:173) notes that networks of civic engagement are needed to create social capital, so environmental scarcity reduces the density of that engagement, thereby eroding the cohesiveness of society and reducing the stock of social capital. This in turn fosters group segmentation with a concomitant increase in group identity (Percival & Homer-Dixon, 1998:281). Civil society retreats in the face of this dynamic and is thus unable to articulate its changing demands on the state. More significantly however, this fragmentation reduces the density of social capital, which in turn creates gaps that are open to the exploitation by powerful social groups. In this regard, Putnam (1993:172) notes that reciprocity is a highly productive component of social capital, so the reduction in reciprocal behavior erodes the social fabric. This is the underlying driver of resource capture, which over time delegitimizes the state and other institutions charged with the responsibility of managing the adaptive responses needed (Percival & Homer-Dixon, 1998:281).

Ingenuity in its broadest sense is thus the set of ideas that can be applied to solve practical technical and social problems such as those arising from the depletion of natural resources (Homer-Dixon, 2000:21). Violence and conflict *per se* cannot arise from environmental scarcity alone. These scarcities need to combine with other factors such as the failure of institutions or government in order to result in open conflict. This consequently supports the conclusion that has been reached by Turton (1999), Turton & Ohlsson (1999), Turton & Warner (2002:67) and Allan (2000:323) that second-order resources are the independent variable, or the key determining factors in water resource management. So if ingenuity is the key to the solution, what exactly is ingenuity? More importantly, how does it work and can it be stimulated?

Homer-Dixon (2000:21-22) says that ingenuity includes a wide range of aspects including new ideas - which he calls innovation - but more importantly, also those ideas that are not necessarily novel but are nonetheless very useful. In this regard, ingenuity can be considered as being the sets of instructions that tell humans how to arrange the constituent parts of their social and physical worlds in a way that helps them achieve specific goals. Ingenuity has both a quantitative and a qualitative element to it however. In a quantitative sense, the amount of ingenuity needed to continue running a system that has been developed, is not the same as the amount needed to initially create that system

in the first place. This is because the nonlinearity associated with both threshold effects and revenge effects, increases the degree of complexity that needs to be managed. In a qualitative sense, the type of ingenuity needed to create new technologies differs from that needed to reform old institutions and social arrangements.

Homer-Dixon (2000:22) has consequently isolated two key forms of ingenuity, namely technical and social ingenuity. *Technical ingenuity* helps us solve the problems that arise in the physical world. An example in the water sector would be the construction of hydraulic infrastructure as part of the hydraulic mission to mobilize water on which social and economic development can be sustained. *Social ingenuity* helps us meet the challenges that humans face in their social world. An example in the water sector is the negotiation of regimes in closing river basins and the reform of water institutions in keeping with the adaptive management that is central to the Molden Model (see Figure 7), the Turton/Ohlsson Model (see Figure 8) and the Reflexive Model (see Figure 10).

More significantly, there is a critical link between the two forms of ingenuity. Social ingenuity is a critical pre-requisite for the generation of technical ingenuity (Homer-Dixon, 2000:22-23). The reason for this is that markets provide the necessary mechanisms and incentives for inventiveness and the creation of new technologies. Politicians bargain for and create coalitions, underpinning them with the necessary incentives to put new institutional arrangements in place. Competent bureaucrats plan and implement public policy, while ordinary people in communities and households build local institutions and change their behavior in order to solve the problems that they face. These forms of social capital are all supplying a continuous source of social ingenuity. One of the outputs of this mobilization of social ingenuity is technical ingenuity. Social ingenuity is thus the independent variable in this equation. As a result of this, society needs ingenuity in order to develop more ingenuity (Homer-Dixon, 2000:232), making this relationship a complex one indeed.

Taking this further, Homer-Dixon (2000:173) notes that broadly speaking there are three kinds of system that humans interact with, namely natural, technical and social systems. The *natural systems* have existed since before *Homo Sapiens* evolved into the dominant species that it is today. These natural systems, such as river basins, have taken billions of years to form and have a dynamic that works over these long periods of geological time. *Social systems* are relatively modern creations, having evolved as products of human evolution and endeavor. The time-scale in these systems is thus relatively short.

Technological systems are man-made with the purpose of interfacing between natural and social systems. As such they can be traced back to early hominid development and are in fact an important element in the ultimate evolution of humans, having enabled them to become masters of their respective environments.

In the development of technological systems, the philosophical basis of modern science is to control nature rather than to understand it. Understanding nature is tolerated insofar as it enables Man to ultimately gain control. This is evident in the work of Francis Bacon (1620) who first described new methods of inquiry into the natural sciences. In this context, Bacon said that one could use the "noble discoveries" that will come from the new method of inquiry to "renew and enlarge the power of the human race itself over the Universe" (Kitchen, 1855: 129). Bacon's thesis was supported in the subsequent work of René Descartes (1637) where he said,

> "[I] saw that one may reach conclusions of great usefulness in life, an[d] discover a practical philosophy [i.e., the natural sciences] … which would show us the energy and action of fire, air, and stars, the heavens, and all other bodies in our environment and [we] could apply them … and thus *make ourselves masters an[d] owners of nature*" (emphasis added) (Anscombe & Geach, 1954: 46).

The control of nature aspect is still relevant today within the natural sciences, and is particularly manifest in hydraulic engineering, where in essence human ingenuity is applied to alter the naturally-occurring hydrological flow patterns, the result of which ecosystems have evolved over millions of years of geological time. Seen in this way, dam building is a profoundly unnatural act, because it seeks to control nature, which is why sometimes "things bite back" in the form of revenge effects that basically increase the degree of complexity that needs to be managed (Tenner, 1996). This philosophical foundation affects the way that humankind constructs knowledge, which in turn impacts on the way that Man interprets information. This has urged social theorists like Giddens (1984: 335) to conclude that there are social barriers to the reception of scientific ideas and provable truths. To this Homer-Dixon (2000:83) says:

> "Seduced by our extraordinary technological prowess, many of us come to believe that external reality - the reality outside our constructed world - is unimportant and needs little attention because, if we ever have to, we can manage any problem that might arise there."

Driven by the belief in the control over nature that is inherent in our scientific knowledge and resultant techno-economic optimism, the world has increasingly become human-impacted, with very few natural systems still occurring. One of the results of this is an increase in the level of complexity (Arthur, 1994 in Homer-Dixon, 2000:103). Another is the growing interdependence between the natural, social and technological systems, which in turn means that a greater chance exists to encounter the unintended consequences of nonlinearities and threshold effects as environmental scarcity increases (Homer-Dixon, 2000:173). In this regard it has been shown that the ingenuity requirement goes up as environmental problems worsen, because societies need more sophisticated technologies and institutions to reduce pollution and to conserve, replace and share natural resources (Homer-Dixon, 2000:23). It is precisely these aspects that are in short supply in the developing world.

The supply of ingenuity thus involves both the generation of good ideas, as well as their implementation within society (Homer-Dixon, 2000:23). When examining this in more detail, it was discovered that many of the critical obstacles occur not when the ingenuity is created - there is usually not a shortage of good ideas - but rather when people try to implement these ideas. In fact, the biggest obstacle is often political competition among powerful groups in society, which stalls or prevents key institutional reform (Homer-Dixon, 2000:23). The supply of social ingenuity is therefore the major bottleneck in society (Homer-Dixon, 1995), in which the benchmark was defined as the amount of ingenuity needed to compensate for any aggregate social disutility caused by environmental stress. Stated differently, this is the minimum amount of ingenuity that a society needs to maintain its current aggregate level of satisfaction, despite the stress caused by environmental scarcity (Homer-Dixon, 2000:23). Stated simplistically, it is the inability of developing states to innovate in the face of complex challenges, which causes them to fail (Barbier & Homer-Dixon, 1996). Central to this observation is the conclusion that developing countries tend to fail because they are unable to generate or use new technological ideas in order to reap greater economic benefits. The crucial factor in this equation is the quality of public institutions, where resource scarcities affect the potential for innovation. Seen in this light, first-order resource scarcities directly affect the adaptive capacity of society, thus increasing second-order resource scarcity (Ohlsson, 1999:156).

Emerging from this argument, Homer-Dixon (2000:1) notes that there is a concept called the ingenuity gap. This is the main reason why developing countries fail (Barbier &

Homer-Dixon, 1996; Homer-Dixon, 1995; Homer-Dixon, 1996). It seems therefore that ingenuity cannot easily be created or stimulated, because in essence it is a product of social capital, which in turn can be understood as being the synergistic application of second-order resources in society.

3.4.6 Ingenuity and Institutional Learning

Having determined that second-order resources are an independent variable, and having established that ingenuity is a form of second-order resource that is needed to adapt water management institutions, it is instructive to explore the linkage between ingenuity and institutional learning. In this regard, the views of Brooks *et al* (2002:11) offer some insight, when they say that:

> "It is an implicit thesis of this review that wider application of the related concepts of second-order scarcity and of social adaptive capacity would provide a more productive way by which to differentiate among resource management responses to water scarcity, and their implications for policy design in different cultures, different socio-economic conditions, and different eco-regions. Thus we concur with Turton's conclusion on 'the need for changes to take place within a social entity in order to meet the challenge of increased water scarcity'".

Krasner (1983:12) has shown that regimes are needed to manage complexity. In fact, the increase in complexity can become one of the fundamental *stimuli* for regime creation in the first place. Central to this is the generation of knowledge (Haas, 1980). In essence there are five completely distinct, but extremely important, elements to this form of knowledge that needs to be understood. *Technical information* is the foundation of knowledge, but data on its own does not constitute knowledge. This technical information must be *processed and evaluated* before it becomes knowledge, so there must be agreed-upon scientific methodologies at work within the chosen institutional setting. *Consensus* needs to be generated on the validity of the initial data, as well as the methodologies used to evaluate those data, if the resultant output is to become knowledge. Consensus building is a social process with a strong political dimension to it. The resultant *output of this process* must result in changed perceptions about the core problem being confronted by the regime or institution. If there is no change in perceptions about this core problem over time, then the knowledge is probably not legitimate simply because insufficient consensus has been reached on the initial data, the methodology used to evaluate those

data, or the final result of this process. This *new knowledge* must become the basis of new policy that guides the regime in the attainment of the institutional goal that arises from the changed perception of the core problem being confronted.

Seen in this light, the *difference between information and knowledge is the process of legitimization*. Knowledge is institutionalized and is seen to be legitimate, whereas information need not necessarily be so. Legitimate knowledge, when captured in an institutional setting, results in more than adaptation - it results in institutional learning as well. Adaptation becomes the institutional response to the process of institutionalized learning, which in turn is the result of the social processes of consensus building and legitimization. It should come as no surprise then that institutional development is an incremental process, particularly in contested arenas where suspicion is high. In this regard, Ostrom (1990:190) suggests a model for negotiation by noting that,

> "Success in starting small-scale initial institutions enables a group of individuals to build on the social capital thus created to solve larger problems with larger and more complex institutional arrangements. Current theories of collective action do not stress the process of accretion of institutional capital. Thus one problem in using them as foundations for policy analysis is that they do not focus on the incremental self-transformations that frequently are involved in the process of supplying institutions. Learning is an incremental, self-transforming process".

Learning is necessary, because adaptations need to be made as regimes are created and institutions are developed. In this regard Ostrom (1990: 190) found that the activities of external political regimes were positive factors in helping most of the groundwater producers in southern California to self-organize, but such activities were negative factors in preventing continued self-organization in other cases that she has studied. As a result of this, a theory of self-organization and self-governance of smaller units within larger political systems will need to take the activities of the surrounding political systems into account. This means in effect that successful models from a given location cannot necessarily be transplanted into other hydropolitical settings and be expected to work. The reason for this is the culture-bound nature of problem definitions, threat perceptions and norms governing cooperative behavior, all of which are intimately linked to the specific historic experiences of the various role-players.

Ostrom (1990:191) has concluded that there are three problems that current theories of collective action fail to take into account. These have major ramifications for regime creation because they reduce the effectiveness of existing theoretical models for providing the foundation for the policy analysis of institutional change. These three shortfalls in existing theory include the:

- need to reflect the incremental, self-transforming nature of institutional change;
- importance of the characteristics of external political regimes in an analysis of how internal variables affect levels of collective provision of rules;
- and the need to include information and transaction costs.

It seems therefore that while institutions are capable of learning and adapting - to which it can now be said with a degree of confidence that this is related to second-order resource availability - there is in effect little by way of acceptable theory that can guide an analysis of how and why institutions succeed (or fail). In short, current theory does not link concepts like first-order resource, second-order resource, social capital, adaptive capacity and ingenuity, all of which are vital elements in the desecuritization dynamic of closed international river basins.

3.4.7 Indices of Second-Order Resource Availability

How can ingenuity be linked to the management of water resources in a closing international river basin? The UNDP, the World Bank, the GWP and the WWC now promote the concept of IWRM, which is essentially based on the French model. This is an administrative approach based on treating the entire river basin as a unit of management, and focuses on the establishment of various technical administrative units (River Basin Commissions) combined with user groups (River Basin Authorities) where stakeholders discuss, and reach agreement on, the appropriate goals. This approach places great demands on the administrative capacity of states, which are exactly the type of resources that are scarce in many developing countries (Ohlsson, 1999:189-190).

Central to this is the role of institutions, which specify the range of socially permissible, required or recommended actions in any given situation (Homer-Dixon, 2000:283). Institutions also generate and make available key information about the actions of others (i.e. they reduce uncertainty), which is a key function of regimes in closing river basins if the zero-sum outcome of securitization is to be avoided. Two hundred years ago US

President Thomas Jefferson realized that the complexity of institutions must rise in response to the complexity of the human interactions that they are intended to manage, and the tasks that they are expected to perform (Homer-Dixon, 2000:283). This takes one back to the adaptation that is assumed in the Molden Model (see Figure 7), the Turton/Ohlsson Model (see Figure 8) and the Reflexive Model (see Figure 10).

Is the concept of ingenuity helpful? In answering this question, Ohlsson (1999:151) has the following critique about Homer-Dixon's theory:

> "Yet, opting for the terms 'ingenuity' and 'ingenuity gap', Homer-Dixon never takes the last step. I can but speculate about the reasons, since the parallel seems so obviously fruitful: i) the resources societies need to mobilize in order to deal with challenges posed by scarcities of natural resources are distinctly social in character; ii) a failure to mobilize enough such social resources rightly ought to be termed a social resource scarcity; iii) highlighting the social resource scarcity aspect of a perceived natural resource scarcity shifts the attention from attempts of getting more of the scarce resource (often frustrating and conflict-creating), to concentrating on efforts to adapt".

So what is missing from this conceptualization is the ability to change the nature of the underlying paradigm that informs water resource management. While this paradigm is changing at present, it is still generally about seeing water as a problem, and as such it is still predominantly first-order in focus, even if it has introduced some second-order dimensions (Ohlsson & Lundqvist, 2000).

It has been shown that second-order resources are the independent variable and thus the key determining factors of the outcome of basin closure, yet there is nothing available in the literature to take one beyond this point (Turton, 1999; Turton & Ohlsson, 1999; Turton & Warner, 2002:67; Ohlsson & Turton, 1999; Ohlsson & Lundqvist, 2000; Allan, 2000:323). In reality, there are simply no agreed-upon indicators that can be used to measure the existence of second-order resources in society.

In an attempt to overcome this problem, Allan (2000:322-325) has taken the initial conceptual development that was done by Turton (1999), Turton & Ohlsson (1999), and Ohlsson & Turton (1999), and concretized this into an indicator of second-order resources. Using gross national product (GNP) *per capita* adjusted to purchasing power parity (PPP), Allan has produced a matrix for the MENA countries. This matrix shows on

the vertical axis, the level of water security in each country, measured as the volume of freshwater available *per capita* per year. On the horizontal axis the degree of adaptive security is measured, using the World Bank data on GNP *per capita* per year. This shows a good split of countries between possible combinations of water-rich but adaptive societies; water-rich and non-adaptive societies; water poor and non-adaptive societies; and oil rich and adaptive societies. The selection of GNP as an indicator was taken to embrace the capacity of society to mobilize resources for the development of institutions and consequently to generate a range of adaptive coping strategies. Alcamo (2000:164) supports the use of such data as an indicator of state susceptibility. In this regard, the highly aggregated data is valuable because it exists over long time sequences, and it can be linked to the state capacity to respond to crisis. In similar vein, Homer-Dixon (2000:101) has shown that adaptation is unlikely to occur in poor countries, so a measure of relative wealth, particularly if this can be used in a comparative fashion, is a valid albeit crude indicator. From the application of this methodology, Allan (2000:325) has concluded that it is the social and political process that in turn enables water policy reform, and not *vice-versa*.

Taking this further, Turton & Warner (2002:65) have developed a similar Resource Matrix for Selected African Countries (see Figure 13). This matrix embraces the following concepts, for an analysis of various countries that are found in Southern and East Africa:

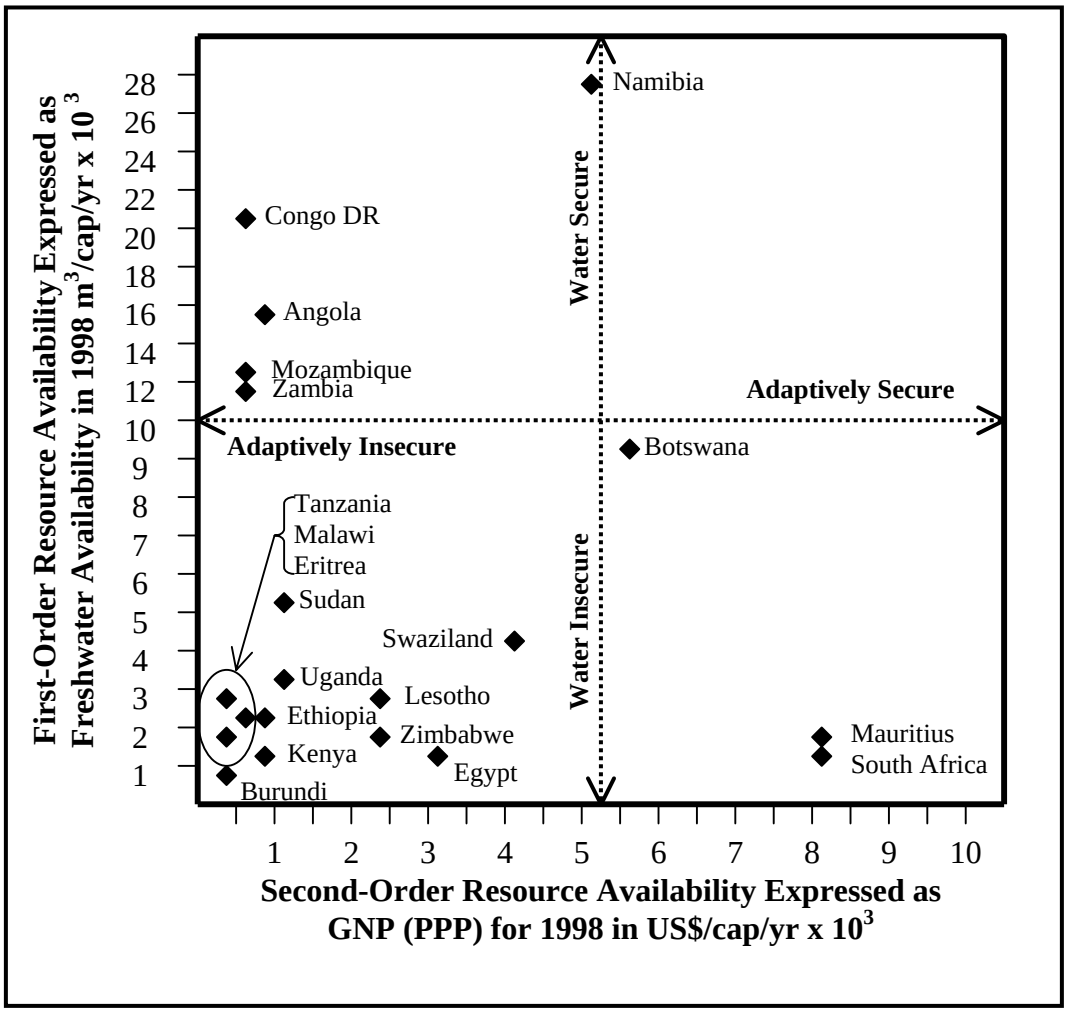
Structurally-induced relative water abundance (SIRWA): This is located in the lower right hand quadrant and includes Botswana, Mauritius and South Africa, which mostly have first-order type of water resource problems (i.e. problems primarily related to the availability of water rather than the development of institutions).

Structurally-induced relative water scarcity (SIRWS): This is located in the upper left hand quadrant and includes Angola, the Democratic Republic of Congo (DRC), Namibia, Mozambique and Zambia, which mostly have second-order type of water resource problems (i.e. problems related to the development of institutions and infrastructure with which to mobilize and distribute water as a basis for economic growth and social development).

Water poverty (WP): This is located in the lower left hand quadrant and includes Lesotho, Malawi, Swaziland, Zimbabwe, Tanzania, Burundi, Egypt, Eritrea, Ethiopia,

Kenya, Sudan and Uganda, which have a complex set of problems relating to both first-order and second-order resource scarcities (i.e. they have insufficient water for sustained economic growth and development, and they also have limited institutional capacity with which to resolve these problems).

Figure 13. Resource Matrix for Selected African Countries.

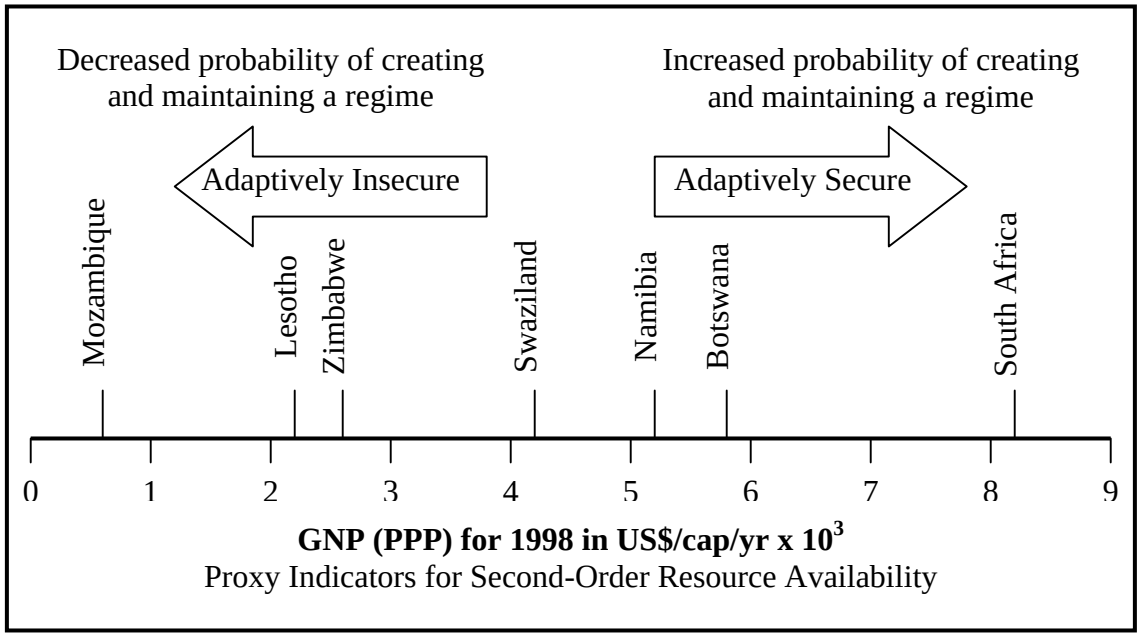


Source: Redrawn from Turton & Warner 2002:65 using World Bank Atlas 2000 data and layout from Allan, 2000:324.

From an assessment of this Resource Matrix for Selected African Countries (see Figure 13) it can be shown that in all cases presented, the relative abundance (or scarcity) of the second-order resource seems to determine the outcome of development potential of the state concerned and is thus the independent variable (Turton & Warner, 2002:67). Where there is a relative abundance of first-order resources in conjunction with a relative

scarcity of second-order resources, the developmental potential is likely to remain low. This condition can be labeled SIRWS, which is an unhealthy condition that policy development should seek to actively counter. Where there is a relative scarcity of first-order resources in conjunction with a relative abundance of second-order resources, the developmental potential is likely to be high. This condition can be labeled SIRWA, which is a healthy condition to be actively sought as a policy-outcome. Where there is a relative scarcity of both first-order and second-order resources, the developmental potential is likely to remain low. This condition can be labeled WP, which is a debilitating condition that is likely to result in a spiral of social and economic decay over time, with no apparent end in sight short of external intervention in some form. Under these conditions, policy intervention is likely to be exogenous in nature, being dependent on third party involvement.

Figure 14. Adaptive Security Spectrum for South Africa's Co-riparian States.



Source: Drawn from World Bank 2000:42-43 data used in Turton & Warner 2002:65.

Arising from the data shown on this Resource Matrix for Selected African Countries (see Figure 13), the theoretical propensity for regime creation and (dys)functionality can be plotted with respect to the second-order resource availability across the spectrum of riparian states found in the various international river basins under review in the South African component of this study. This is shown as the Adaptive Security Spectrum for South Africa's Co-riparian States (see Figure 14) and is based on the available evidence

that poor countries are less likely to mobilize the necessary social and technical ingenuity, and will thus be less likely to negotiate and sustain a regime on their own (Homer-Dixon, 1995; Barbier & Homer-Dixon, 1996). Consequently, the states to the left of the spectrum are adaptively insecure, and are thus less likely to be able to mobilize the necessary second-order resources to create a regime; whereas the states to the right of the spectrum are more adaptively secure, and are thus more likely to be able to mobilize the necessary second-order resources to create and sustain a regime. This finding will be tested in the South African case study (see Chapters 4 & 5).

GNP *per capita* adjusted to PPP provides a highly aggregated dataset of second-order resource availability for all of the riparian states that share an international river basin with South Africa. In terms of the logic that has been developed in this literature review, there is a decreased probability of creating and maintaining a regime the further one moves to the left of the spectrum, with a greater chance of dysfunctionality over time. The converse holds true the further one moves to the right of the spectrum. The veracity of this theoretical conclusion will be examined in more detail in light of the empirical data on regime creation (see Chapters 4 & 5).

3.4.8 Conclusion Regarding the Necessary Conditions for Regime Creation

From the literature overview it can be seen that the primary function of second-order resources within the context of river basin management is the development of institutions, technologies and knowledge with which to manage the potential zero-sum outcomes of basin closure. This is done through two key processes, namely the reduction of the uncertainty caused by basin closure, and the development of appropriate coping strategies.

The reduction of the uncertainty caused by basin closure for all riparian states and other role-players is a key process of desecuritization, because it is in essence perceptions of insecurity that are the fundamental driver of conflict. The core issue that needs to be tackled is the institutionalization of the conflict potential that is naturally inherent to basin closure. Consequently the main empirically verifiable indicators of the existence of such a second-order resource are the ability to generate three key elements: basin-wide data; a common set of rules and procedures; and a conflict mitigation mechanism.

The development of appropriate coping strategies capable of managing the wide range of problems arising from the threshold effects of basin closure is also a key process of desecuritization, because in essence there is insufficient water to be distributed between riparians to meet all demands being made on the overall system, so something has to be done other than to simply share water. The core issue that needs to be tackled is a redefinition of the perceived problem of water deficit. Central to this is the transformation of the perceived problem away from one of absolute scarcity (where water is seen as a finite resource) to one of relative scarcity (where water is seen as an abstract resource that can be traded in the form of virtual water). Consequently, the main empirically verifiable indicator of the existence of such a second-order resource is the ability to gain consensus on the data, thereby legitimizing it and making it uncontested. Seen in this way, the effects of scale become manifest. Water deficit is thus seen as a local phenomenon, possibly up to the level of the river basin. There is no water scarcity at the global level, so the remedy therefore lies beyond the scale of the river basin (where IBTs have been the traditional solution), and can be found in a range of options including the management of demand, the inter-sectoral allocation of water and the global trade in virtual water.

In the absence of literature on more refined indicators, second-order resources - such as adaptive capacity, social capital or ingenuity - are likely to manifest in a number of ways in the context of regimes in international river basins. An indicator of *technical ingenuity* within various regimes is the ability of any given riparian state to generate hydrologically-relevant data without external assistance. Indicators of *social ingenuity* within various regimes are:

> (a) The ability of any given riparian state to legitimize the hydrologically-relevant data by means of negotiation and analysis, and transform it into knowledge (as defined in Chapter 1).
>
> (b) The ability to negotiate a set of rules and procedures that form the normative basis of a regime that is acceptable to all the riparian states in a given international river basin.
>
> (c) The ability to negotiate an agreement in times of crisis on an issue that has not been incorporated into the initial rules and procedures. This indicates the adaptive capacity of the institution, or the ability to maintain the agreement over time.

(d) The ability to make allocative decisions that are deemed to be fair by all of the riparian states in the international river basin using the knowledge that has been produced through technical ingenuity.

(e) The existence of a conflict management structure as an integral component of the regime.

3.5 Conclusion

A review of the literature relevant to the dynamics of the desecuritization of water resource management enables some insight to be generated at the theoretical level, with applicability to the rest of this study. Returning now to the overall statement of the problem - how can the zero-sum outcome of basin closure be transformed into a plus-sum outcome in South Africa's international river basins? - a number of conclusions that are relevant to the dynamics of desecuritization can be drawn at this stage.

The *third sub-problem* asks what are the alternatives to the securitization of water resource management that exist in an international river basin facing closure? An analysis of this question from the perspective of theory shows that:

(a) Regime creation can effectively desecuritize water resource management while still maintaining the necessary security of supply.

(b) Even in the highly contested Jordan River basin, there are traces of a water regime, but this is not yet functioning amongst all role-players at the basin level.

(c) From this the Desecuritization Model was developed (see Figure 6).

The *fourth sub-problem* asks what are the critical elements of regime creation that can be considered as a management model in the various South African international river basins? From an analysis of this question it can be concluded that central to the long-term survival of the regime is the ability of the institutional arrangement to generate sufficient uncontested knowledge, which results in a redefinition of the perception of the core problem away from water as an absolute scarcity, to water as a relative scarcity. The critical elements of regime creation consist of three distinct aspects:

(a) A common set of rules and procedures that have been agreed upon by all riparian states and are thus uncontested.

(b) A set of hydrological data that forms the basis of all water management decisions, including water allocation between riparian states, which is relatively uncontested.

(c) A formal conflict mitigation structure as an institutional arrangement that is capable of dealing with the inherent conflict potential related to basin closure.

The *fifth sub-problem* asks what is the necessary condition for the establishment of a regime in a closed (or closing) international river basin? From an analysis of this question it can be concluded that there must be sufficient second-order resources in existence, also known as social adaptive capacity, ingenuity or social capital. There are two distinct components to this:

(a) The first is related to the technical elements such as data generation. More specifically, during the demand management phase of water resource management, the choice of end-use efficiency, or intra-sectoral allocative efficiency mechanisms, is biased towards the need for technological ingenuity, such as the development of water saving devices.

(b) The second is related to social elements, such as the agreement on norms and the negotiation of rules and procedures around which a regime is built. More specifically, during the adaptive phase of water resource management, the need to make use of inter-sectoral allocative efficiency mechanisms is heavily biased towards social ingenuity in order to effectively restructure society.

From the combined review of literature for all five sub-problems (see Chapters 2 & 3), and in particular from the Securitization Model (see Figure 3) and the Desecuritization Model (see Figure 6), a new Integrated Model can now be generated (see Figure 15). From this Integrated Model it is apparent that second-order resources are indeed the critical elements in transforming the zero-sum outcome of basin closure into a plus-sum outcome and are thus the independent variable. It now remains to determine to what extent the various elements of this model are evident in the South African case study (see Chapters 4 & 5). In other words, is there evidence of basin closure in the four

international river basins to which South Africa is a riparian state? If so, is there any evidence of the securitization of water resource management? Conversely, is there any evidence of regime creation, and if so what have been the basic drivers, and what are the current stumbling blocks? In short, will all the riparian states that share the four international river basins with South Africa, be in a position to negotiate and maintain water regimes in response to the shared problem of water scarcity? This will be the main focus of the next chapter.

Figure 15. Integrated Model Showing the Linkage Between the Securitization and Desecuritization Dynamics in a Closing International River Basin.