Chapter 1

THE PROBLEM AND ITS SETTING

1.1 Background to the Problem

Water resources are relatively finite, with a given volume of freshwater in circulation at any one moment in time through the global hydrological cycle. Natural fluctuations in this hydrological cycle cause temporary disturbances to the distribution of this relatively finite volume of water, with extreme events such as droughts and floods impacting differently on various regions of the world. This fluctuation is more pronounced in some parts of the world than in others, with Southern Africa in general being one of the areas that is characterized by extreme variability (Rabie & Day, 1992:647). In fact, it is this variability that forms the basic driving force behind the ecosystems evolving under such conditions. In some instances humans have chosen to inhabit areas that are less well endowed with water. This means that they have had to evolve a set of coping strategies over time, inadvertently becoming what Descartes referred to in 1637 as "masters and owners of nature" (Anscombe & Geach, 1954:46). In rapidly developing countries that are located in areas of aridity, this often gives rise to the hydraulic mission of the state, which has as its central aim, the mobilization of water resources and the guarantee of a high security of supply (Reisner, 1993:112-114). In some parts of the world, water insecurity, combined with a strong hydraulic mission, has resulted in the securitization of water resource management in international river basins. This study focuses specifically on the political aspects of institutional developments in the water sector as it pertains to South Africa's international river basins, and is about such processes. Southern Africa as a geopolitical region has certain unique characteristics, making this study particularly appropriate to the field of international relations:

- The region has a rapid population growth, with many populations doubling (and more) in a thirty-eight year period (Turton & Warner, 2002:58). The water wars literature considers this to be a fundamental driver of conflict.

- The Southern African region is characterized by a large number of international river basins, with no less than fifteen of them traversing the geographic area of the Southern African Development Community (SADC). Three of these are large enough to link more than 8 different states (Nile, Zaire and Zambezi) (Pallett *et*

al., 1997:71; UNEP, 2002:27). In fact, continental Africa is connected through these shared river basins to such an extent that South Africa (in the extreme South) is linked to Egypt (in the extreme North), through the Limpopo, Zambezi, Zaire and Nile river basins, all of which meet on common watersheds in the sovereign territories of various SADC member states. This arises from the colonial experience where rivers (rather than watersheds) were used to demarcate future state borders.

- A recent study of hydropolitical conflict has shown that of the seventeen international river basins in the world that can be considered to be "at risk", 8 of these are in Africa (Incomati, Kunene, Lake Chad, Limpopo, Okavango, Orange, Senegal & Zambezi), with 6 being in the SADC region (Incomati, Kunene, Limpopo, Okavango, Orange & Zambezi) of which 3 are rivers to which South Africa is a riparian (Incomati, Limpopo & Orange) (Wolf *et al.,* 2003:47).

- While the SADC region is in transition from a period of conflict to a period of potential peace, stability and economic development, the results from the study by Wolf *et al* (2003) suggest that particular attention must be given to the management of international rivers if peace is to become an enduring condition.

- The most economically developed states in SADC - Zimbabwe, Botswana, Namibia and South Africa - are also among the driest in the region, generally characterized by relatively low levels of precipitation, high levels of evaporation and an inherently high degree of climatic variability. This is a natural driver of potential conflict if states compete for strategic access to water.

- These states - Zimbabwe, Botswana, Namibia and South Africa - are all riparians to the international river basins that are found in South Africa, with 3 of these known to be "at risk" (Incomati, Limpopo & Orange) (Wolf *et al.,* 2003:47).

- As a result of these crosscutting linkages, it is argued that a hydropolitical complex is starting to emerge in Southern Africa, given the strategic importance that water plays in the economic development and social stability of these states. As a result of this process, the ramifications of this concept are investigated in the study by using the various international river basins that are found in South Africa as a source of empirical case study data.

The central issue that is under scrutiny relates to the political aspects of institutional developments in the water sector as it pertains to the four South African international river basins. At the very heart of this issue is the conflict potential that is inherent in basin closure, with the Middle East North Africa (MENA) region providing many examples of this. It is from this set of examples that the literature on water wars has emerged (Bullock & Darwish, 1993; de Villiers, 1999; Falkenmark, 1989a; Falkenmark, 1994; Gleick, 1992:23; Gleick, 1993a:96; Gleick, 1994; Starr, 1991). This form of literature, which tends to dominate most hydropolitical studies, provides a skewed representation of reality by extrapolating future water scarcity projections from historic trends in a near-linear fashion; and then concluding that the likely outcome will be conflict because the actual resource-base is relatively finite (Turton, 2002a:13). This teleological argument is deconstructed in the study and examined in greater detail. The doomsday scenarios that this body of water war literature develops, suggests that conflicts are more-or-less inevitable, as population-induced water scarcity outstrips available supply. This raises the crucial issue of managing scarce water resources in international river basins, particularly those facing closure and thereby becoming a possible limiting factor to the economic growth potential of the state. This is a key component of the study. In short, this study seeks to generate a scientific report that accurately reflects the South African experience, where peaceful coexistence seems possible rather than the debilitating outcomes that the water war pundits once confidently predicted. The major focal points that form the logical structure of this study are encapsulated in the following questions:

- If water scarcity has an inherently high conflict potential, what can (or should) be done to mitigate that conflict?

- What are the fundamental hydropolitical dynamics at work in shared international river basins facing closure?

- How can one understand the political dynamics of securitization, desecuritization, regime creation and institutional development, in the context of the international river basins in South Africa?

1.2 The Research Question

The fundamental research question relates to the political aspects of institutional developments in the water sector as applicable to South Africa's international river

basins. At the heart of this lies the linkage between basin closure and possible future political dynamics between riparian states. Consequently the fundamental research question asks how the potential zero-sum outcome of basin closure can be transformed into a plus-sum outcome in South Africa's international river basins?

1.2.1 The Sub-problems

In order to provide an adequate answer to the fundamental research question, 5 related sub-problems have been isolated. These seek to determine the following:

(a) *First sub-problem:* What are the possible consequences of basin closure in an international river basin?

(b) *Second sub-problem:* What are the possible consequences of increasing levels of insecurity within a closed (or closing) international river basin?

(c) *Third sub-problem:* What are the alternatives to the securitization of water resource management that exist in an international river basin facing closure?

(d) *Fourth sub-problem:* What are the critical elements of regime creation that can be considered as a management model in the various South African international river basins?

(e) *Fifth sub-problem:* What is the necessary condition for the establishment of a regime in a closed (or closing) international river basin?

1.2.2 The Hypotheses

In order to attack the fundamental research question, the following hypotheses have been developed with respect to each sub-problem:

(a) *First hypothesis:* If basin closure is left unchecked then it can give rise to an increasing level of insecurity in different riparian states within the given international river basin, which can translate into a fundamental national security concern when the economic growth potential of the state depends on secure access to that water.

(b) *Second hypothesis:* If increasing levels of insecurity arise from basin closure in an international river basin, then one of the possible outcomes is a process of securitization, whereby a hydropolitical security complex emerges. The process of securitization is generally based on a zero-sum principle, so consequently this sparks off an escalation in the levels of insecurity for downstream users of the water, thereby exacerbating the conflict potential that already exists between the riparian states. Broader threat perceptions therefore play a role in either attenuating, or accelerating this process, because they are formed through historic experience and influence decision-making into the future.

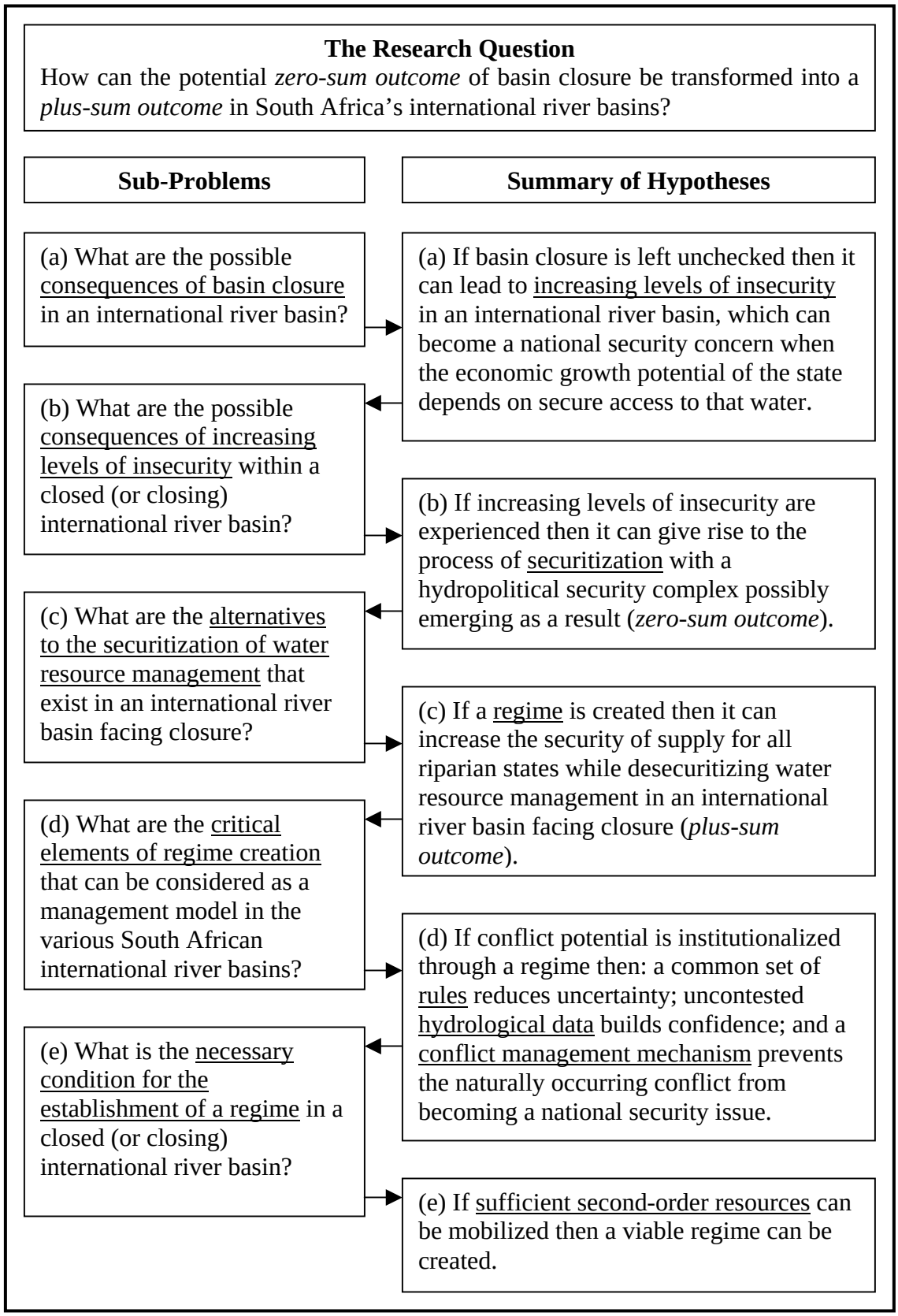
(c) *Third hypothesis:* If regimes are based on a plus-sum principle, then regime creation can become an effective mechanism for increasing the security of supply, while actually desecuritizing the management of water resources in an international river basin that is facing closure.

(d) *Fourth hypothesis:* If the conflict potential is institutionalized, and a confidence building mechanism is established between potentially hostile riparian states by means of a regime, then three critical elements are needed in order for this to be effective. These are: (i) a common set of rules and procedures that are mutually acceptable to all of the affected role-players, because this fosters the plus-sum principle by reducing uncertainty, and creates the normative foundation for future cooperation; (ii) uncontested hydrological data because this builds confidence and creates the capacity to manage problems effectively; (iii) a conflict management mechanism needs to be developed in order to address the naturally existing conflict potential that is inherent in basin closure, because it prevents the conflict from escalating into an issue of possible national security concern.

(e) *Fifth hypothesis:* If sufficient second-order resources can be mobilized by the various riparian states, then a viable regime can be created within the respective water resource management structures in a closing international river basin.

The logical framework for this study is created by the need to answer the fundamental research question. This is developed through the systematic interrogation of the various sub-problems and the subsequent validation of their respective hypotheses, as illustrated in Figure 1, thereby creating a chain of cause-effect linkages that enable the highly nuanced nature of the fundamental research question to be answered.

Figure 1. The Sub-problems and Hypotheses.



1.3 The Delimitation of the Study

The study focuses on the regimes that exist within the international river basins that are found in South Africa as defined in the *United Nations Register of International Rivers* (United Nations, 1978: 6 & 9), as refined by Wolf *et al* (1999:395-399) and presented in UNEP (2002:27, 32, 36, 37 & 43). These basins are the:

- Orange River that is shared between Lesotho, South Africa, Botswana and Namibia. This basin is categorized by Wolf *et al* (2003:47) as being "at risk".
- Limpopo River that is shared between South Africa, Botswana, Zimbabwe and Mozambique. This basin is categorized by Wolf *et al* (2003:47) as being "at risk".
- Incomati River that is shared between South Africa, Swaziland and Mozambique. This basin is categorized by Wolf *et al* (2003:47) as being "at risk".
- Maputo River that is shared between South Africa, Swaziland and Mozambique.

Within the context of these four international river basins, the study focuses on regimes that have already been created to which South Africa is a party; are in the process of being created with South Africa as a party; or regional cooperative activities that involve, or that could result in, the creation of new regimes to which South Africa is a party at some time in the future.

1.4 The Definition of Concepts

Hydropolitics as a discipline is relatively new and generally lacks conceptual rigour. It is also being developed by scholars from a variety of disciplines, each with their own set of core concepts and perceptions of reality, resulting in the fact that many hydropolitical concepts are used interchangeably with a high degree of ambiguity. For the purpose of this study, the following definitions apply:

Abstraction. The abstraction of water is the withdrawal of water from a river, lake, reservoir or aquifer for reticulation elsewhere (common usage).

Actor. An actor, in the context of security complex theory (SCT), is a person, agency or institution that seeks to either securitize or desecuritize specific issue areas (adapted from Buzan *et al.,* 1998: 26, 32-42).

Adaptive capacity. Adaptive capacity is the amount of social ingenuity and technical ingenuity available within a given state (or institutional manifestation of the state) with which to solve critical problems such as water deficit (Ohlsson, 1998:9; Ohlsson, 1999:163).

Allocative efficiency. Allocative efficiency is the efficiency of the productive activity involving water that would yield the best return per unit of water used (Turton & Ohlsson, 1999). There are two broad categories of allocative efficiency, namely inter-sectoral and intra-sectoral allocative efficiency. These are based on the relative degree of sectoral water efficiency that is inherent to specific economic sectors.

Aridity. Aridity is the climatic description of an area that expresses the relationship between precipitation and potential evapotranspiration, in which the naturally occurring precipitation is lower than the potential evapotranspiration demand (adapted from Arnestrand & Hanson, 1993:8, 14 & 20).

Basin closure. A river basin with no utilizable outflow of water is a closed basin (Seckler, 1996). A river basin is said to be facing closure when all of the available water has been allocated to some productive activity and there is no more water left to be allocated (Svendsen *et al.*, 2001:184). This differs from the hydrological definition of the term where a closed basin is a basin that has an outflow into internal seas, lakes or other sinks (Wester *et al.*, 2001:161).

Coping strategy. A coping strategy is a policy response to a relative scarcity of a first-order resource that represents an empirically verifiable indicator of a second-order resource being applied (own definition).

Crisis. A crisis is an unstable or crucial time (or state of affairs) that has been brought about by environmental stress, which requires extraordinary measures to counteract (Alcamo, 2000:164). This can become a trigger event driving future securitization processes.

Demand-induced scarcity. Demand-induced scarcity is a form of environmental scarcity that is caused by a growing population with rising demands for greater prosperity (Ohlsson, 1998:4).

Demand-sided management approach. A demand-sided management approach is that style of water management adopted by a state, or structures within that state, that is deliberately aimed at curbing or controlling the demand for water. These methods include tariff structures, penalties, efficiency of delivery and preferential allocation to specific economic sectors that display a higher sectoral water efficiency (own definition).

Desecuritization. Desecuritization is the shifting of specific (strategically important) issues out of emergency mode and into the formal bargaining processes of the political sphere (Buzan *et al.,* 1998:4). It is the opposite of securitization.

Drought. Drought is a naturally occurring, true meteorological event involving irregular precipitation, which causes spells of exceptionally dry years (Arnestrand & Hanson, 1993:18).

Ecological marginalization. Ecological marginalization arises from resource capture where weaker social groupings are economically marginalized as the direct result of pressure that is placed on their environmental support-base (Homer-Dixon, 1994:10; Homer-Dixon, 1996:360; Percival & Homer-Dixon, 1998:287; Ohlsson, 1999:38).

End-use efficiency. End-use efficiency refers to an element of a coping strategy that seeks to improve the efficiency of water delivery to its point of use, at the level of the production unit, such as the improvement in irrigation technology. This is fundamentally different to allocative efficiency, but a coping strategy using allocative efficiency logic may include end-use efficiency elements as well (own definition).

Endogenous water. Endogenous water is that portion of the overall water resources of a country, or region, consisting of precipitation that falls within the geographic area of that country, or region, which does not evaporate, and which feeds aquifers and surface water drainage basins (Falkenmark & Lindh, 1993:82).

Endoreic. An endoreic river system is one that terminates inland, rather than into the sea (exoreic) due to changes in geological, climatic or environmental factors over time (adapted from Seeley *et al.*, 2003).

Environmental security. Environmental security concerns the maintenance of the local and planetary biosphere as the essential support system on which all human enterprises depend (Buzan, 1991:19-20; Buzan *et al*., 1998:76).

Environmental stress. Environmental stress refers to the intensity of an environmental change that involves an undesirable departure from long-term or normal conditions, is usually of short duration, is directly or indirectly influenced by society, and is not only the result of natural geological factors (Alcamo, 2000:164).

Exogenous water. Exogenous water is that portion of the overall water resources of a country or region, consisting of water originating from outside of the geographic area of a country, or region, and flowing into that country or region through underground aquifers or surface water drainage basins (Falkenmark & Lindh, 1993:82).

First-order resource. A first-order resource is a natural resource like water and land, which can be either scarce or abundantly available (adapted from Ohlsson, 1999).

First-order scarcity. A first-order scarcity is the scarcity of a first-order resource such as water, which can be either short-term such as that experienced during a drought, or long-term such as a water deficit that occurs at a basin level because of over abstraction (own definition).

Functional actors. Functional actors are actors who affect the dynamics of a sector, without being the referent object or the actor calling for security on behalf of a referent object, such as an environmental non-governmental organization (NGO) (Porter & Brown, 1991; Buzan *et al.*, 1998:36). This is an actor that significantly influences decisions in the field of security such as NGOs and third-party actors (Buzan *et al.*, 1998:79).

Gross geographic product. The gross geographic product (GGP) is a measure of the total flow of goods and services produced within a given geographical area of any specific national economy over a specified period of time (own definition adapted from common usage in the South African water sector).

Groundwater. Groundwater is any water, whether running in a defined channel or not, that is found underground (O'Keeffe *et al.*, 1992:304).

Heterogeneous security complex. This approach to SCT assumes that the regional logic can integrate different types of actors that interact across two or more sectors such as states, nations, firms and confederations interacting across the political, economic and societal sectors (Buzan *et al.,* 1998:16).

Homogenous security complex. This approach to SCT retains the classical assumption that security complexes are concentrated within specific sectors and are therefore composed of specific forms of interaction among similar types of units such as power rivalries among states (Buzan *et al.,* 1998:16).

Hydraulic mission. The hydraulic mission of a state is the official policy that seeks to mobilize water and improve the security of supply as a foundation for social and economic development (adapted from Reisner, 1993:112-114; Turton & Meissner, 2002:38).

Hydropolitical security complex. A hydropolitical security complex is a special form of regional security complex that exists when those states that are part "owners" and technically "users" of shared rivers start to consider the rivers to be a major national security issue (Schulz, 1995:97).

Ingenuity. Ingenuity consists of the ideas that can be applied to solve practical technical and social problems, such as those arising from water scarcity and water deficit (Homer-Dixon, 2000:21). There are two distinct forms of ingenuity - social ingenuity and technical ingenuity - that are both manifestations of adaptive capacity or a second-order resource (Ohlsson, 1998:9; Ohlsson, 1999:163).

Ingenuity gap. An ingenuity gap exists when there is a shortfall between the rapidly rising need for ingenuity and the inadequate supply of ingenuity within a given social entity (Homer-Dixon, 2000:1). An ingenuity gap is the manifestation of a second-order resource scarcity in society.

Institution. An institution is a set of formal and informal rules, including their enforcement arrangements (Schmoller, 1900 in Furubotn & Richter, 2000:6). Institutions differ from regimes in the aspect of enforceability.

Instream flow requirement. The instream flow requirement (IFR) is the minimum flow of water that has been reserved, as part of an overall water management plan, for the maintenance of the ecological integrity and biological functioning of that river system (King & Louw, 1996).

Inter-basin transfer. An inter-basin transfer (IBT) constitutes the transfer of water from one geographically distinct river catchment, or basin to another, or from one river reach to another (Davies *et al*., 1993:161).

International drainage basin. An international drainage basin is an area within the territories of two or more states in which all the streams of flowing surface water, both natural and artificial, drain a common watershed, terminating in a common outlet or outlets, either to the sea, a lake or to some inland place, from which there is no apparent outlet to the sea (Maluwa, 1992:22). Article II of the *Helsinki Rules* defines an international drainage basin as being a geographical area extending over two or more states determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus (Akweenda, 2002:101).

International river basin. An international river basin is the area that contributes hydrologically (including both surface and groundwater) to a stream when any of the perennial tributaries crosses the political boundaries of two or more states (Wolf *et al.*, 1999:389).

International subsystem. An international subsystem consists of units within the international system that can be distinguished from the entire system by the particular nature or intensity of their interactions with, or interdependence on, each other (Buzan *et al.*, 1998:6).

Inter-sectoral allocative efficiency. Inter-sectoral allocative efficiency is achieved by allocating water away from an economic sector or activity that has a low sectoral water efficiency, usually agriculture, to another economic sector that has a higher sectoral water efficiency, usually industry (Turton & Ohlsson, 1999). It is a necessary condition for managing basin closure effectively and is typically used as a policy option in the latter stages of basin closure.

Intra-sectoral allocative efficiency. Intra-sectoral allocative efficiency is achieved by allocating water within a given economic sector, usually at the level of the production unit (farm or factory), away from a productive activity with a low level of efficiency, to an alternative productive activity that has a higher level of efficiency (Turton & Ohlsson, 1999). It is a necessary but insufficient condition for managing basin closure effectively and is typically used as a policy option in the early stages of basin closure.

Knowledge. Knowledge, in the context of regimes, is the sum of technical information and theories about that information which commands sufficient consensus at a given time among interested actors to serve as a guide to public policy designed to achieve some social goal (Haas, 1980 in Krasner, 1983:19). In a hydropolitical context, knowledge refers to the uncontested data that forms the basis of any given regime (own definition).

Lead actor. A lead actor has a strong commitment to the effective international action on an environmental issue in specific cases (Porter & Brown, 1991 in Buzan *et al.*, 1998:77). These lead actors may be states but are not always so, sometimes manifesting in the form of global or environmental epistemic communities (Haas, 1992 in Buzan *et al.*, 1998:77).

Lower order riparian. A low order riparian position is one close to the estuary of the river. In hydropolitical terms this is a vulnerable position as both the water quality and quantity is determined by upstream higher order riparians over which the downstream state has little or no control (Turton, 1998:7).

Micro-region. A micro-region refers to the subunit level within the boundaries of a state or unit (Buzan *et al.*, 1998:19).

Minus-sum outcome. A minus-sum outcome is one that results in a lose-lose solution (common usage).

Norms. Norms, when used in the context of regimes, are standards of behavior defined in terms of rights and obligations (Krasner, 1983:2).

Overlay. Overlay refers to that condition when great power interests transcend mere penetration, and come to dominate a region so heavily that the local pattern of security relations virtually ceases to operate, such as occurred with the European colonization of Africa (adapted from Buzan *et al.*, 1998:12; Buzan & Wæver, forthcoming).

Plus-sum outcome. A plus-sum outcome is a non-zero-sum outcome that results in a win-win solution (common usage).

Policy contingency. Policy contingency is that situation found in regimes in which actors carefully consider the opportunity costs of disrupting a relationship before practicing self-help (Haas, 1983:27).

Principles. Principles, when used in the context of regimes, are beliefs of fact, causation and rectitude (Krasner, 1983:2).

Referent objects. Referent objects are things that are seen to be existentially threatened and that have a legitimate claim to survival such as state sovereignty, national identity, the environment and the economic stability of a state (Buzan *et al.*, 1998:36).

Reflexivity. Reflexivity is said to exist when a given social grouping becomes concerned with the undesirable and unintended consequences of their actions (Giddens, 1990), such as environmental degradation caused by industrialization, and actively seek to limit those consequences by developing coherent strategies, policies, regimes and institutions to effect this desire (Turton, 2000a).

Regimes. Regimes are a set of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations (Krasner, 1982:186; Krasner, 1983:2). Regimes differ from institutions because of their lack of enforceability, but regimes are a form of institution.

Region. A region is a spatially coherent territory composed of two or more states (Buzan *et al.*, 1998:18).

Regional security complex. A regional security complex is a pattern of rivalry, balance of power and alliance configuration among the main powers within a given region, including the impacts of penetration by external powers (Buzan & Wæver, forthcoming).

Resource capture. Resource capture is a social effect of environmental scarcity where more powerful groups of people manage to monopolize access to a critical resource such as water leading to the ecological marginalization of weaker groups of people (Homer-

Dixon 1994:10; Percival & Homer-Dixon, 1998:286; Ohlsson, 1998:4; Ohlsson, 1999:38, Bryant & Bailey, 1997:39). Resource capture can result in structural scarcity and can become an independent variable in hydropolitics when it starts to define the actions of major role-players (Lichtenthäler & Turton, 1999; Turton & Meissner, 2002:38).

Revenge effects. The revenge effects are the ironic and unintended consequences of mechanical, chemical, biological and medical ingenuity (Tenner, 1996:5-6 cited by Homer-Dixon, 2000:178).

Riparian state. According to customary international law, states that are territorially concerned with an international drainage basin are referred to as riparian (Akweenda, 2002:101).

Riparian position. The riparian position refers to the physical location of a state within a given international river basin and hence the position that it adopts within this basin vis-à-vis other riparian states. A high order riparian position is one closer to the source of the river. In hydropolitical terms this is a strong position to be in as theoretically it implies that the state concerned can divert the water and withhold supplies from a lower order state. A low order riparian position is one close to the estuary of the river. In hydropolitical terms this is a vulnerable position as both the water quality and quantity is determined by upstream higher order riparian states over which the downstream state has little or no control (Turton, 1998:7).

Rules. Rules, when used in the context of regimes, are specific prescriptions or proscriptions for action (Krasner, 1983:2).

Sanctioned discourse. The sanctioned discourse is the prevailing or dominant discourse that has been legitimized by the discursive elite within the water sector at any one moment in time (Turton, 2000a; Turton & Meissner, 2002:39). It represents what may be said, who may say it and how it is to be interpreted, thereby leading to the creation of a dominant belief system or paradigm that is sometimes referred to as a hydraulic mission (Reisner, 1993:112-114; Swyngedouw, 1999a; Swyngedouw, 1999b) or the phase of heroic engineering (Platt, 1999). The sanctioned discourse can best be understood as being a form of hydropolitical ideology, particularly when it links up with other ideologies such as nationalism or economic modernization (adapted from Waterbury, 1979:116).

Second-order resource. A second-order resource is a social resource (Ohlsson, 1999). It is the ability of societies, administrative organizations and managers responsible for dealing with natural resource scarcities, to find the appropriate tools (also known as a coping strategy) for dealing with the social consequences of a first-order resource scarcity (Ohlsson, 1999:161). It is consequently a specific form of scarcity, namely the scarcity of the necessary adaptive capacity including skills, data and institutions (see definition of "knowledge") by which basin closure can be managed in a sustainable and relatively conflict-free manner. Some literature refers to this as social capital (Putnam, 1993:167).

Second-order scarcity. A scarcity of the necessary social resources and adaptive capacity, including social ingenuity and technical ingenuity, can be regarded as being a second-order scarcity (Homer-Dixon, 1994:16; Ohlsson, 1999:161).

Sector. A sector is defined in terms of specific security relationships that exist therein. These include: the military sector which is about relationships of forceful coercion; the political sector which is about relationships of authority; the economic sector which is about relationships of trade and production; the societal sector which is about relationships of collective identity; and the environmental sector which is about relationships between human activity and the planetary biosphere (Buzan *et al.*, 1998:7).

Sectoral water efficiency. The sectoral water efficiency is the ratio of water consumed within a given economic sector (expressed as a percentage of total national water consumption) in relation to the contribution of the same economic sector to overall GDP (expressed as a percentage of total GDP). (Sectoral water efficiency = sectoral water consumption as % : sectoral contribution to GDP as %) (Turton, 1998:7).

Securitization. Securitization is constituted by the intersubjective establishment of an existential threat (within any sector) with a saliency sufficient to have substantial political effects (Buzan *et al.*, 1998:25). It is the opposite of desecuritization.

Securitizing actors. Securitizing actors are actors who securitize issues by declaring something, usually a referent object, to be existentially threatened (Buzan *et al.*, 1998:36).

Security complex. A security complex is a set of units whose major processes of securitization, desecuritization, or both are so interlinked that their security problems cannot reasonably be analyzed or resolved apart from one another (Buzan *et al.*, 1998:201; Buzan & Wæver, forthcoming).

Social capital. Social capital refers to the features of social organization such as the trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions (Putnam, 1993:167). Social capital is a form of second-order resource in society, which is needed to negotiate and maintain regimes and is mobilized through social ingenuity.

Social ingenuity. Social ingenuity is needed to create institutions and organizations that buffer people from the effects of natural resource scarcity (first-order scarcity) and provide the right incentives for technological entrepreneurs to develop appropriate solutions (Homer-Dixon, 1994:16-17). Social ingenuity is therefore a precursor to technical ingenuity (Homer-Dixon, 2000:22). It is this type of social capital (or social adaptive capacity) that Ohlsson (1998; 1999) calls a second-order resource, and it is often manifest in an institution.

State susceptibility. State susceptibility is the ability of a state to resist and recover from crisis (Alcamo, 2000:164).

Structurally-induced relative water abundance. Structurally-induced relative water abundance (SIRWA) is a condition that exists when a combination of a low level of second-order resource scarcity and a high level of first-order resource scarcity occur simultaneously in a given society (Turton & Ohlsson, 1999; Turton, 2000a; Turton & Warner, 2002:55). Under such conditions the problem of water scarcity can be effectively managed as the result of sufficient adaptive capacity (or social ingenuity) being available in society.

Structurally-induced relative water scarcity. Structurally-induced relative water scarcity (SIRWS) is a condition that exists when a combination of a high level of second-order resource scarcity and a high level of first-order resource abundance occur simultaneously in a given society (Turton & Warner, 2002:54). Under such conditions the potential water abundance cannot be harnessed for economic growth and development because of the

lack of adaptive capacity (Ohlsson, 1999) or ingenuity (Homer-Dixon, 2000) in society at that specific moment in historic time.

Structural scarcity. Structural scarcity is a form of environmental scarcity that is caused by social inequality or unequal access to the resource, usually as the result of the actions by decision-making elites who monopolize key gate-keeping positions in water resource management institutions (Ohlsson, 1998:4). This is often linked to resource capture that can become an independent variable in hydropolitics when it becomes a driver of political dynamics.

Structure. Structure, when used in the context of regimes, is primarily the distribution of capability among states to act autonomously, measured in terms of the "good exchanged" in a specific regime (Haas, 1983:28).

Sub-region. A sub-region is a part of a region whether it involves more than one state (but fewer than all of the states in the region) or some transnational composition (some mix of states, parts of states or both) (Buzan *et al.*, 1998:19).

Supply-sided management approach. A supply-sided management approach is that style of water management adopted by a state, or structures within that state, that is deliberately aimed at responding to increasing water scarcity by attempts to improve the overall security of supply, usually through engineering-type solutions such as IBTs, pipelines, impoundments etc., without any corresponding attempt to reduce the overall demand on an ongoing basis (adapted from common usage).

Support actor. A support actor is an actor (or actors) that is (are) located away from the danger spots of ecological concern, which by virtue of the issue-specific nature of their central concern, have not yet accumulated into an overall power constellation (Porter & Brown, 1991 in Buzan *et al*., 1998:78). As such, the central issue on which they focus has not yet become a conscious ordering device for society as a whole, in the way that military, economic and identity interests have done (Buzan *et al.*, 1998:79).

Sustainability. A development is considered to be sustainable when the current setting of socioeconomic activities can continue indefinitely, or when current use of a natural resource does not impair possibilities for comparable future uses (Bannink, 1996:34).

Technical ingenuity. Technical ingenuity is needed to develop a coping strategy such as a new set of agricultural and forestry techniques in order to compensate for environmental scarcity (Homer-Dixon, 1994:16). Technical ingenuity is dependent on social ingenuity however, so if the latter is absent then the former is unlikely to develop (Homer-Dixon, 2000:22).

Threshold effect. The threshold effect occurs when a non-linear outcome arises from an incrementally small change in a resource-use pattern, at some point suddenly becoming irreversible (Ohlsson, 1999:62). An example is the drawdown of a water table in an aquifer that suddenly results in irreversible salinization. Under these conditions environmental scarcity becomes an independent variable in its own right. As such the concepts of the threshold effect and nonlinearity are central to any understanding of sustainability in the field of hydropolitics.

Trigger event. A trigger event is a manifestation of the threshold effect, and is a specific event beyond which a non-linear response can escalate a sub-national issue into an international issue, in a relatively short space of time (own definition).

Units. Units are actors composed of various sub-groups, organizations, communities, and many individuals that are sufficiently cohesive to be differentiated from others and to have standing at the higher levels of analysis such as states, nations and transnational firms (Buzan *et al.*, 1998:6).

Veto actor. A veto actor is an actor, usually a state but not always so, that embodies both political and security moves, but which fails to give a useful insight into the actions of security actors within a given sector (Porter & Brown, 1991 in Buzan *et al*., 1998:77).

Virtual water. Virtual water is the volume of water needed to produce a commodity or service (Allan, 1996a). Allan (1996b) notes that it typically takes around 1 000 tonnes of water to grow one tonne of grain. This represents the virtual water value of grain (Turton *et al*., 2000a:12). Virtual water is also present in hydroelectric power and constitutes the volume of water needed to produce a given unit of hydroelectricity (Turton, 2000b:144).

Water barrier. The water barrier is a conceptual unit that measures water stress, and is defined as 2 000 people / flow unit of water ($10^6 m^3 yr^{-1}$), which is the maximum number

of people that an advanced society is able to support and manage with currently available technologies (Falkenmark, 1990:181).

Water deficit. Water deficit refers to the prevailing condition that exists when the demand for, and use of freshwater within a given social entity, exceeds the level of sustainable supply (Turton & Ohlsson, 1999; Turton, 2002b; Turton & Meissner, 2002:39).

Water demand management. Water demand management (WDM) refers to the set of coping strategies that water resource managers develop, which are designed specifically to reduce the demand for water, as opposed to the augmentation of supply. In this respect, WDM can yield a volume of water that can be used to delay the planned future augmentation of supply through a conventional supply-sided management approach. The effectiveness of a WDM strategy is an indicator of second-order resources within society (Turton & Ohlsson, 1999; Turton *et al.*, 2000b; Turton, 2002b).

Water poverty. Water poverty (WP) is a condition that exists when a combination of a high level of second-order resource scarcity and a high level of first-order resource scarcity occur simultaneously in a given society (Turton & Warner, 2002:55). Under such conditions the problem of water deficit cannot be effectively managed due to a scarcity of adaptive capacity and technical ingenuity, so a spiral of underdevelopment starts to occur from which it becomes increasingly difficult to escape (Allan & Karshenas, 1996:127).

Water regime. A water regime exists when the affected states observe a set of rules designed to reduce the conflict potential, caused by the use, pollution or division of a given water resource; or the reduction of the standing costs; and the observance over time of these rules (Haftendorn, 2000:65).

Water resource management. Water resource management refers to all of the decision-making activities and associated institutional arrangements needed for the abstraction of bulk and untreated water found in river basins or in groundwater aquifers, and its subsequent delivery in raw form to the place where it is in demand (own definition adapted from common usage in the South African water sector).

Water scarcity. Water scarcity is the condition that exists when the demographically-induced demand for water exceeds the prevailing level of local supply (Turton & Ohlsson, 1999; Turton & Meissner, 2002:39).

Zero-sum outcome. A zero-sum outcome is a fixed-sum outcome that results in a win-lose solution (common usage).

1.5 The Importance of the Study

The discipline of international relations is relatively new, having emerged after the First World War, and is still regarded by many as being an inter-discipline rather than an individual discipline (Hollis & Smith, 1990:16). As such it generally lacks concrete models that are capable of adequate explanation and prediction. According to Homer-Dixon (2000:292), political science as a discipline has produced very little useful new knowledge capable of guiding scholars into an uncertain future with some degree of confidence. This reflects a positivist bias that is questioned in the social sciences, and is not only a problem in international relations or political science, for as Homer-Dixon (2000:293) notes:

> "The social sciences plod along behind [the natural sciences], unable to generate fast enough *the knowledge we need to build new institutions* for our new world. The renowned management expert Peter Drucker sums up the problem this way: 'Effective government has never been needed more than in this highly competitive and fast-changing world of ours, in which the dangers created by pollution of the physical environment are matched only by the dangers of world-wide armaments pollution. *And we do not have even the beginnings of the political theory or the political institutions needed for effective government* in the knowledge-based society of organizations'" (Drucker, 1994 in Homer-Dixon, 2000:293) (emphasis added).

In contrast to the natural sciences, where the wall of knowledge is built brick by brick, political science, like anthropology and sociology, is not very accumulative (Homer-Dixon, 2000:293). To this end, Allan (2000:190-191; 2001) notes by way of example, that one hydropolitical concept which has been converged upon by different disciplines is that which some describe as "emblematic events" (Hajer, 1996), another as "windows of opportunity" (Kingdon, 1984), and yet others as "security politics" (Buzan *et al.*, 1998), whereas in reality they seem to be unacquainted with each others' work on what is essentially the same thing. Systematic multidisciplinarity (or interdisciplinarity) it seems, is largely absent in studies of the environment in general, and hydropolitics in particular.

Theory development is particularly absent in the literature on hydropolitics, for as one commentator concludes:

> "As a specific sector is concerned - namely the water discourse - it is obvious that international relations theory as such, or any explicit attempt to construct such a theory, is singularly absent. What is at issue, are theoretical pointers in the water discourse and their relevance to international relations theory (Du Plessis, 2000:12)… [I]t is advocated that participants in the water discourse should exhibit a greater sensitivity towards and explicitly involve themselves more in theorizing, irrespective of the level of theory (i.e. contending theoretical positions, partial theory, or hypotheses-testing theory) and the order of theory (i.e. theorizing about theory, theory about the international relations context of water, or ideas and thoughts on how to manage the water issue) (Du Plessis, 2000:28-29)."

This is particularly true for the field of water resource management in international river basins facing closure, where the existing literature tends to focus on river basins with a high conflict potential, suggesting that water resource management and conflict are an inevitable outcome of basin closure, but generally without offering much by way of theory to describe, explain or predict outcomes (Turton, 2002a:13). This approach to the study of hydropolitics is not very useful in a geographic setting such as Southern Africa, where there is limited historic experience of open water-related conflict at the international level, at least for the time being. Under such conditions, there is very little development of useful theory (Wolf, 2003:1), which is important because as Basson (1999) notes, a long-term crisis is looming in South Africa's international river basins, necessitating the development of durable institutions. This study therefore seeks to contribute to the development of knowledge that is practically useful in two distinct ways. Firstly, to assist water resource managers as they negotiate international agreements and develop suitable transnational institutions with which to manage the shared water resources in any given international river basin, and in particular those basins located in South Africa. Secondly, to contribute to the international relations, political science and hydropolitics literature by integrating existing concepts and theories, and by developing a deeper understanding of linkages that may be found within the water sector.

This is achieved by focusing on four distinct areas of existing international relations, political science or hydropolitics theory. The first is the process of securitization and desecuritization that is found in the body of literature that is known as SCT (Buzan *et al.*,

1998; Buzan & Wæver, forthcoming). This body of theory has some relevance to water resource management in international river basins that are facing closure, where access to water becomes a strategic concern given the social and economic ramifications of this condition. More specifically there is a natural securitization dynamic at work in some international river basins facing closure, which may have unintended consequences if left unmanaged.

The second is the process of institutionalization (as opposed to institutional development as this occurs in the formal sense of the definition of an "institution") that can be found in the literature on regime theory. While the majority of the existing regime theory literature is focussed on issues other than water resource management, there is a lot that can be applied to hydropolitics in international river basins. One aspect that is of particular relevance is the role of regimes in building confidence between riparian states and thereby reducing insecurity in the face of increasing water deficit. The role of crisis is particularly relevant in this regard, with the avoidance of crisis becoming an important security concern, potentially leading to regime creation (Alcamo, 2000:164).

The third is a relatively new and as yet poorly developed literature that is capable of explaining why regime creation fails, or conversely what is needed as a pre-condition for the successful negotiation and continued maintenance of a regime in an international river basin. In this regard the concept of second-order scarcity is used. This is based on the research being done by Ohlsson (1998; 1999) in the field of what he calls social adaptive capacity; work being done by Homer-Dixon (1994; 1995; 1996; 2000) in the field of what he calls ingenuity; and work being done by Putnam (1993) and Ostrom (1990; 1994; 2000) in the field of what they call social capital. The usefulness of the concept of a second-order resource as a generic label for adaptive capacity, ingenuity and social capital is examined, and where relevant, integrated into security complex theory and regime theory.

Finally, these three separate strands of theory are integrated into a coherent model that can hopefully explain and predict some of the political dynamics of institutional development in South Africa's international river basins. This is part of an ongoing attempt to develop the newly emerging field of hydropolitics as a distinct field of international relations and political science theory (Turton, 2002a; Wolf, 2003:1).

1.6 Research Design and Methodology

This research is based on descriptive analysis methodology (Good & Scates, 1954:277) and is presented in terms of the structured model proposed by Leedy (1993). In essence there are three distinct components to this research.

- The securitization (and possible desecuritization) aspects of water resource management in the respective international river basins within the study area.

- The development of regimes in the respective international river basins within the study area.

- The process of institutionalization in the respective international river basins within the study area.

Firstly, the methodology and concepts that deal specifically with the securitization (and desecuritization) component to this research is guided by Buzan *et al* (1998) and Buzan & Wæver (forthcoming) with respect to the gathering and interpretation of data. As such, the levels of analysis that are used are presented in Figure 5, where items in parenthesis indicate how the respective level is used in this study. It has been shown that scale is an important aspect of hydropolitics (Turton, 2002a:17). Consequently the level of analysis that is indicated in Figure 5 ranges from: the individual (in the context of SCT this is a specific decision-maker that has a political impact); through the respective national bureaucracies (in the context of SCT these are the various Departments of Water Affairs with an interest in a specific international river basin); the riparian state as a sovereign entity and therefore a specific role-player in any interstate dialogue with respect to international river basins (in the context of SCT these are important - but not exclusive - units of analysis); to the international subsystem (in the context of SCT this is SADC as a regional political grouping); finally up to the international system level (in the context of SCT this is the global inter-state political system). These have been adapted from Buzan *et al* (1998:5-6). In this regard there is a natural congruence in the epistemological requirements of both SCT and hydropolitics, rendering this approach highly suited to the purpose for which it has been selected.

In keeping with Buzan *et al* (1998), the instruments of measurement that are used are presented in Table 8. These relate specifically to the levels of analysis introduced in the previous paragraph and define what instrument of measurement is used for each level of analysis in the context of SCT. In this regard: the regional level is SADC with the unit of measurement being the SADC Water Protocol when applied to hydropolitics; the sub-regional level is the international river basin with the unit of measurement being a river basin organization (RBO), or a regime that is specific to any given international river basin(s); while the micro-region is a catchment within any given international river basin, or component of that international river basin that falls under the sovereign control of a riparian state and is managed by a bureaucratic structure such as a catchment management agency (CMA) (or equivalent) at the sub-national level. These have been adapted from Buzan *et al* (1998:18-19), with the key defining parameter being state sovereignty expressed as a function of scale.

The types of units that are involved in security complex analysis, along with details of the way that they are used in this study, are presented in Table 7. Consistent with the logic used in the above two paragraphs, the units of analysis are scale-specific, meaning that a specific level of analysis focuses exclusively on a specific unit of analysis. As used in this study: the referent object is the perception of economic and social stability by the political elite of a specific riparian state with a strategic interest in a given international river basin; the securitizing actor is either an affected riparian state with a strategic interest in a given international river basin, or a lead actor that is not a riparian state; and a functional actor is a non-affected riparian state in a given international river basin. These have been adapted from Buzan *et al* (1998:36) for the purpose of this study.

The sectors that are examined within the emergent hydropolitical security complex are presented in Table 9. It must be noted that given the central role of water as a life sustaining resource, water deficit impacts on the economic and environmental sectors, even being linked with the political and military sectors under certain conditions, so these sectors are also analyzed where relevant.

The key questions that are used to analyze the securitization processes of water resource management in the South African case study are as follows:

(a) Is there evidence of the securitization of water resource management in any of the international river basins in South Africa? (i) If so, who are the main securitizing actors

and what are their long-term objectives? (ii) If so, what is the referent object that is being existentially threatened; by whom is it being threatened; and what is the nature of that threat? (iii) Who are the functional actors, support actors and veto actors; what are their long-term objectives; and what is the nature of the relationship between them?

(b) Is there evidence that water scarcity can have an impact on the economic growth potential and social stability in any of the riparian states found in the international river basins in the study area? (i) If so, what is the nature of that impact and how is this threat perception being articulated?

(c) Is there any evidence of the desecuritization of water resource management in the study area? (i) If so, who are the functional actors, and what are their long-term objectives? (ii) Is there any evidence that regimes are acting as potential desecuritizing agents?

(d) Is there any evidence that a hydropolitical security complex is emerging, or is likely to emerge, within the study area in the near future? (i) If so, what are the main drivers of this process? (ii) If so, can the emergent hydropolitical security complex be regarded as being a component of a broader regional security complex?

Secondly, the methodology and concepts that deal specifically with the creation of regimes are guided by the framework proposed by Gupta *et al* (1993) with respect to the collection and interpretation of data. This methodology requires that a parallel study of each regime involving South Africa be made, which is done within the context of the four separate international river basins - Orange, Limpopo, Incomati and Maputo - using the following three questions as a guide:

(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?

In support of this, and in an attempt to flesh out more detail of the political dynamics of regime creation in South Africa's international river basins, the four key questions that

are posed by Haas (1983:28-29) for the study of regimes are used as a general guide for the analysis of the data from the South African case study. These are as follows:

(a) How do regimes originate and change? The outcomes that a given regime is to produce are a good to be managed in order to provide a benefit to all of the members. The empirical question about the origin of regimes, and in particular about the dynamics of their evolution and change over time, makes use of several key terms including interest, common interest, costs, benefits, and collective goods (Haas, 1983:28).

(b) What structural principles explain regimes? This is an analytical question that seeks to pinpoint non-perceptual features of international relations that constrain actor behavior. Power and hierarchy are core concerns in defining structure, which is primarily the distribution of capability among states to act autonomously, measured according to the "good exchanged" in a specific regime. Because regimes arise when the respective states realize that a defined distribution of "the goods" cannot occur by way of self-help or autonomous action, interdependence is recognized as a regrettable condition (Haas, 1983:28). The key concepts that guide this question are therefore hegemony and coalition (Haas, 1983:29).

(c) How do regimes work? Goods are delivered through agreements that are negotiated. As a result of this, bargaining becomes a key process that needs to be focussed on specifically (Haas, 1983:29). Consequently the concept of second-order resources becomes crucial (Ohlsson, 1999; Ohlsson & Turton, 1999; Allan, 2000:322-325), because without such resources being distributed among all of the relevant actors, regimes are unlikely to be negotiated in the first place; and where negotiated, are unlikely to be either durable or resilient.

(d) What purposes do regimes serve? The teleology of regimes is the core normative question that concerns all schools of thought, because it focuses on the question of order. Thus while various schools of thought would agree on the first three questions, they are likely to differ sharply on the purpose that a given regime is to serve (Haas, 1983:29).

Thirdly, the methodology and concepts that deal specifically with the process of institutionalization are guided by the following key questions:

(a) Is there hydrological data that has been institutionalized?

(b) Is this data uncontested and therefore seen as a legitimate basis for future agreements between the respective riparian states?

(c) Are there agreed-upon rules and procedures? If so, have they been formalized, or do they exist only as a loose arrangement?

(d) Is there a dedicated conflict resolution mechanism as part of the overall institutional arrangement? If so, has it been used and what has been the outcome?

(e) Has there been a re-definition of the core management problem away from perceiving water scarcity in an absolute sense, to perceiving water scarcity in a relative sense? To what extent has water demand management become one of the institutional objectives? Is there any evidence of inter-sectoral allocative efficiency being a policy objective?

(f) Is there a mechanism to sanction a non-compliant actor? If so, has it been used and what has been the outcome?

(g) Has there been any redistribution of water resources between the various riparian states directly as the result of the regime? If so what has been the outcome?

(h) Is there any evidence of regime resilience?

(i) Is there any evidence of regime robustness?

(j) Is there any evidence of regime effectiveness?

(k) Is there any evidence of the growth and development of institutional knowledge or institutional learning as the result of the regime? If so, to what extent has this become a confidence-building and unifying factor?

(l) Can the existing water management arrangements within the international river basin in question be called a regime?

(m) What is the likelihood that the regime will evolve into an institution over time?

1.7 Structure of the Study

Due to the fact that hydropolitics is a relatively new discipline, there is a general paucity of theory. To this end Wolf (2003:1) refers to "the almost total lack of theory about the *problematique* of international water", going on to say that "with the exceptions of [Tony] Allan and his colleagues at the London School of Oriental and African Studies (SOAS) ... [Allan and] Turton ... continued to be a lone voice in the theoretical wilderness for years ... [with] the dialogue [being] almost devoid of any theoretical underpinnings". Allan (2000:191-191) supports this by referring to the evolution of almost identical concepts in different academic disciplines, all of which are relevant to hydropolitics, but none of which have been integrated or harmonized in any useful way. This poses a distinct challenge for the study, because in essence it means that theory first needs to be developed in a systematic way before it can be applied to the actual South African case study. For this reason a clear distinction needs to be drawn between the *theoretical* and the *practical* sections of this study, the layout of which has posed a distinct challenge to the author. This challenge has arisen because it is impossible to have a purely theoretical section, followed by a separate practical section in which that theory is applied to a specific case study, as would be the normal procedure for an endeavour of this nature. In order to resolve this problem, the theoretical elements needed are synthesized through a review of available literature from a variety of sources, with one distinct aspect of this being a case study of the Jordan River basin. That case study has been necessary in order to develop the theory needed to evaluate the consequences of basin closure (first sub-problem) and the resultant increasing levels of insecurity arising from basin closure (second sub-problem).

In order to meet the 2 stated objectives of this study - firstly to assist with the negotiation of agreements in international river basins by generating useable knowledge, and secondly to contribute to the literature by integrating concepts and existing theories as appropriate to hydropolitics (irrespective of how incomplete those theories might be or from which discipline they are originally sourced) - it is therefore structured around 4 logical sections each laid out as follows:

The first section deals with the *preliminaries* relating to the development of the analytical framework based on: the background to the problem; the fundamental research question including the sub-problems and hypotheses; the delimitation of the study; the definition of key concepts; the importance of the study and the research design and methodology;

all of which are presented in Chapter 1. This provides the specific analytical framework that structures the rest of the study, particularly with respect to the final evaluation in the fourth section.

The second section is focused specifically on the *selected theoretical dimensions* needed to analyze the South African case study. Clustered around Chapter 2 and Chapter 3, this section reviews the available literature on the five sub-problems and in essence presents the theory that is needed for the subsequent practical application of the study to the South African case as delimited in Chapter 1. This theory is developed as necessary where it is scant. A key component of this is a case study of the Jordan River basin that is presented in Chapter 2, which deals exclusively with the dynamics of the securitization of water resource management as applicable to the first and second sub-problems. This chapter synthesizes the theory needed in the third section from a variety of sources, but mostly as it applies to the Jordan River basin, which was selected because it is the best possible example of basin closure and the consequences of increasing levels of insecurity. The Jordan River basin is thus an extreme example of a worst-case scenario. Chapter 3 deals exclusively with the dynamics of the desecuritization of water resource management as applicable to the third, fourth and fifth sub-problems. Given the fact that the literature on this aspect is more of a mainstream nature, there is no need for a specific case study from which to distil the necessary theory, but where relevant the Jordan River basin is used. This literature is sourced from a range of disciplines wider than the normal scope of international relations, so this chapter also synthesizes the theory needed for the third section in an appropriate fashion.

The third section consists of the *practical applications of the theory* that were presented (and where necessary developed) in the previous section. Chapter 4 is a descriptive overview and analysis of the South African case study. This is followed in Chapter 5 by the analysis of key hydropolitical processes, which are evident in the South African case study, by means of the specific analytical framework that was developed in the first section.

The fourth section consists of an *evaluation of the South African case study* in terms of the analytical framework that was presented in Chapter 1. Contained in Chapter 6, this seeks as a minimum to evaluate the veracity of the hypotheses, and where appropriate (and empirically possible) to validate them. This chapter also contains the conclusion and a comprehensive bibliography, thereby rounding off the study in a formal sense.