Water and Development Management

Water and Regional Integration

The role of water as a driver of regional economic integration in Southern Africa

REPORT to the WATER RESEARCH COMMISSION

Zambezi River, at Caia, Mozambique

Professor Mike Muller, Dr Claud Chikozho and Brian Hollingworth

WRC Report No 2252/1/14

March 2015

Obtainable from
Water Research Commission
Private Bag X03
GEZINA, 0031

orders@wrc.org.za or download from www.wrc.org.za

ISBN 978-1-4312-0651-3

Executive Summary

This report considers whether and how different approaches to the development, management and use of water resources might contribute to regional integration in Southern Africa and concludes that water does not make an important direct contribution. Its political symbolism may have an important indirect impact and should not be under-estimated. However, 'hydro-centric' approaches, that prioritise the protection of water resources over support to the achievement of social and economic objectives may undermine even that benefit.

How were these conclusions reached?

The study addresses the prior, general, question of how the development, management and use of water resources contribute to promoting sustainable socio-economic development, which is usually cited as the primary goal of regional integration in Southern Africa. It also reflects on evolving concepts of regional integration and the relevance of new ideas about regionalism to the discussion. Since much of Southern Africa's surface freshwater flows in rivers that are shared by a number of countries, it focuses on the specific challenges that these present and considers emerging forms of environmental regionalism and governance.

The availability of water has underpinned the development of a number of early civilisations, from Central America, Egypt and Mesopotamia to India, Java and China. The historic linkages between water and socio-economic development in regions delineated by water has led to a wide-spread belief that water and its management can contribute to regional social and economic development and integration. Since regional integration remains a political and economic priority for Africa, the management of water resources in shared rivers has been identified as an important area for cooperation.

A review of evolving ideas about regional integration raises some questions about the validity of this assumption. While the initial drive for integration in Africa was political, attention is currently directed to its potential economic benefits. There is an expectation that, by improving competitiveness and productivity, economic integration will help African countries to address the small size of most of their economies, the lack of structural complementarities between them as well as their dependence on imports to meet most of their needs. In this context, one objective of regional integration is to ensure the availability of key inputs to the economy such as water, power and transport at reduced costs. But it is not obvious that the development achievements of the "hydraulic past" can be replicated in the 21st century.

Technological innovation has provided many, often cheaper, alternatives to water as a source of power and a means of transportation. It has also enabled the development of water supply schemes that can capture water over a wide area and transport it, relatively economically, over longer distances. Investment in transport and communications infrastructure has opened up new areas for agricultural production. These factors have reduced the location-specific importance of water, whose availability thus no longer provides a unique stimulus for economic development.

There are similar grounds for questioning the contribution of water resources to regional economic integration. Whereas transportation and communication requires the establishment of compatible infrastructure to enable neighbouring countries to interact and trade, water resources provide their own "network infrastructure" in the form of rivers and lakes. The large volumes of water required for economic purposes and their relatively low value means that the physical tradability of water is limited. Only in specific circumstances will it be possible for the required amount of hydropower to

be generated or, more rarely, water to be supplied to users, more cheaply by infrastructure shared by more than one country than at national or local level. Even then, the transaction costs and inherent risks of such cooperative arrangements may reduce their attractiveness.

Empirical investigation reinforces the need for caution. There is limited evidence of a significant potential in Southern Africa for a direct contribution of cooperative water resource development and management to regional economic activity. There is relatively limited trade in water-related production. There are not many high-impact strategic projects that, through cooperation, could yield significant net regional benefits much less *directly* promote greater regional integration and the value of proposed regional water projects is small relative to other infrastructure sectors. There is also that the inherent risks and transaction costs have constrained cooperation in a number of cases.

This is not to deny the obvious scope for cooperation. There have already been significant, usually bilateral, cooperative interventions in the region. The Lesotho Highlands Water Project augments water resource availability in South Africa and generates significant public revenues for Lesotho. Joint power generation projects between Zimbabwe and Zambia and between Namibia and Angola contribute to those countries electricity needs. Cooperation between Zimbabwe, Zambia, Mozambique and Malawi has helped to mitigate floods on the Zambezi. There is local cross-border cooperation in water supply (Ressano Garcia/Komatipoort) and irrigation (Namibia/South Africa; Malawi/Tanzania; Swaziland/South Africa). But these cooperative activities are limited in number and scale.

Further opportunities identified include hydropower projects that could serve regional needs although these are often only marginally cheaper than national electricity generating projects and the benefits of cheaper generation may be outweighed by the costs of transmission and the perceived risks of dependence on external supplies. Underlining the limited contribution of water to regional integration through power generation is the fact that the region has an expanding range of energy alternatives available to it – oil, gas, coal as well as new renewables. As a result, the proportion of electricity contribution derived from hydropower is unlikely to grow with the decline in the proportion of energy sourced from coal balanced by the increase in that sourced from gas and new renewables. Only the rapid development of the full potential of the Inga scheme in the Democratic Republic of Congo (DRC) could alter this.

Greater cooperation in the operation of dams to regulate flows in the Zambezi River could further mitigate the impacts of floods and droughts more effectively than at present and yield more power, more reliably while still supporting agriculture and environmental protection. However, this would benefit some countries while imposing costs on others, notably upstream irrigators, and the design of a satisfactory compensatory mechanism to address this will present substantial political challenges.

The uneven distribution of water resources across the region as well as the fact that there is a relatively weak correlation of rainfall variability between different zones across the region also creates potential complementarities that could support regional cooperation in agriculture and strengthen food security. But the political challenges of restructuring food production across fifteen sovereign countries, in many of which agriculture is the mainstay of the economy and society, cannot be under-estimated.

The region's water resources may, nonetheless, contribute *indirectly* to regional integration. If and when shared transboundary rivers become more heavily used and competition emerges between actual and potential users, the management of potentially negative impacts on one country by the actions of another will become more important. In this regard, the establishment of institutional

arrangements to avoid conflicts, whether formal organisations or simply effective liaison, will do more than avoid unnecessary constraints on resource development and use. It may contribute to wider political and economic integration by demonstrating to sceptical national audiences that regional integration is not just possible but also beneficial.

The approach taken to achieve such cooperation is important. There has been a concerted effort to establish formal river basin organisations for water management on SADC's shared rivers. But the study concludes that this has been driven primarily by environmental considerations, and a desire to establish new forms of environmental governance within environmental rather than administrative or political boundaries, a practical example of a "new regionalism".

It makes technical sense to use river basins as preferred geographical unit for hydrological and ecological analysis. However, successful water resource management requires engagement between water users and water for policy, monitoring, regulatory and financing purposes as well as for accountability to the wider society. And most water ***users*** are organized at scales that reflect political boundaries while water ***uses*** occur within economic rather than hydrological boundaries. So the study suggests that regional integration will be more effectively supported if water management institutions are organized at those scales; focused on "policy-sheds" or "problem-sheds" rather than watersheds.

Based on these considerations, the key conclusion of the study is that, while the development and use of the region's water resources may not make a major direct contribution to regional integration, they do have the potential to make a significant indirect contribution. Political symbolism may be more important than actual outcomes. Water may contribute to regional integration precisely because there are limited interactions on shared rivers and countries have less to gain or lose than in other domains, which makes it easier to cooperate. The greatest contribution that water resources and their management can make to regional integration may be to show that cooperation for mutual benefit can, on occasion, generate greater benefits from all parties than through national action alone.

The study concludes with some practical recommendations for approaches that could ensure that water resource management contributes to the SADC goal of greater regional integration.

One recommendation is that the focus of cooperation should be functional rather than institutional – addressing specific shared problems rather than establishing institutions to deal with them if they arise. This recommendation is equally applicable to wider approaches to integration which are currently under discussion in Southern Africa.

The other key recommendation is that approaches to water management on shared rivers should by 'hydro-supportive' rather than 'hydro-centric'. Cooperation to achieve the region's socio-economic development ambitions is more likely to gain support and produce results than a focus on environmental protection.

Figure 1: Shared rivers in Southern Africa

Table of Contents

Tables

Figures

Annexes

Introduction

Background to the Project: Responding to the request for proposals

In 2012, the Water Research Commission of South Africa commissioned a study "***To examine the role of water as a driver of regional economic integration in Southern Africa".*** This report is the primary output from that study**.** (A copy of the Request for Proposals (RFP) is attached in Annex 1).

The RFP highlights the challenges presented by the different scales at which various economic and water management activities are undertaken and of the resulting complexity of decision-making across different sectors. It raises questions about how the Regional Economic Communities (RECs) engage with water governance and the extent to which national governments are prepared to cede some sovereignty in this area. And it asks whether the river basin organisations are the appropriate channels through which to link water resource management to broader development strategies.

It is widely assumed that there is a need for transboundary cooperation in the management of water resources; that environmental governance needs to be considered from a regional perspective. Some of these assumptions are contested and the RFP asks "are regional arrangements really better?"

In responding to the RFP, the study began with the understanding that the empirical basis of much of the current conventional wisdom would need to be tested and that this evidence would be used to guide the analysis and conclusions. The approach respects and reflects, as appropriate, the many and diverse academic perspectives on the subject.

However, the scope of the study is extremely broad and necessarily covers a range of disciplines, discourses about development, the politics and economics of regionalism and its institutions as well as differing perspectives on environmental governance in what is increasingly recognized to be the Anthropocene period in earth history. As well as a clear understanding of the theoretical construct of regional integration a review of relevant Southern Africa, African and global experience to provide an empirical base for the analysis has to be developed.

The study was required by the RFP to address some specific objectives, namely:-

> "1. To investigate water's role in regional integration in the following dimensions:
>
> > a. The way in which water is addressed in institutional arrangements such as regional economic communities (RECs) (SADC, SACU, COMESA, EAC, as well as the SADC-EAC-COMESA Tripartite Alliance); and river basin organizations (RBOs). What lessons can be drawn from the way in which water is addressed in traditional RECs, and applied within the new Tripartite Alliance?
> >
> > b. Water as an engine for regional integration and socio-economic development.
> >
> > c. Water as a constraint to regional integration and what the potential solutions may be.
>
> 2. To explore how economic dynamics related to commodity production cycles generates new regions, such as for water, minerals and energy. This objective is also related to the link

> between water and the mandate of RECs i.e. how water helps or hinders the development of the mining industry and its implications for regional trade."

Some issues raised have quickly been put aside. It was not possible to develop the theme of "commodity regions" since this concept has not been well defined in economics or trade literature; there are numerous factors that determine whether commodity production is focused in particular regions and little evidence to suggest that water has a primary role beyond the obvious requirement of water in its different forms as an input to agriculture.

It also rapidly became obvious that some of the organisations mentioned, notably SACU and the COMESA-EAC- SADC Tripartite, have a minimal interest in water; the status of SACU as a REC is, in itself, contested (Makgetlaneng 2014); the Tripartite's focus is primarily on trade, transport and communication with no mention whatever of water in its summary of infrastructure priorities (COMESA-EAC- SADC 2015).

More substantive is the concern about how water issues are handled by Africa's principal institutions of regional cooperation and integration, the five formal Regional Economic Communities. But underlying this is the nagging primary question:-

> "…. why are we pushing better water governance at the regional level? The justification for the need to explore alternative models of water governance (regional approaches, multi-level approaches) stems from the concern with increasing transaction costs of global regimes and the resultant "global convention fatigue." These concerns are producing a shift in the locus, impetus, implementation, and innovation to regional levels. Additionally, the theoretical applicability of alternative approaches relates to the observation that studies of regional politics now require an expansion beyond traditional preoccupations with economic integration and security cooperation, to areas of environmental security and sustainable development. Essentially, in this project, we have to interrogate this hypothesis. Are regional arrangements really better?"

So the primary focus of the study has been on the overarching objectives, to understand water's role

- as an engine for regional integration and socio-economic development; and
- as a constraint to regional integration.

These can be summarized in the statement that water is a driver of regional integration and it is this hypothesis that is tested by the study.

The other, secondary set of issues that arises is how best the governance and management of water should be organized. As outlined in the RFP:-

> "In addressing these and other water governance challenges, and advancing the understanding of alternative approaches, important research questions deserve further investigation. These relate to the emergence and manifestation of regions from the environmental perspective; the evolution, desirability, effectiveness, and efficiency of regional environmental governance; the applicability and role of existing regional institutions in addressing environmental challenges in addition to economic and socio-political realities; relationships within, among, and beyond regions in multi-level arrangements; and the repercussions of regional water governance for democratic legitimacy, accountability, and transparency. In essence, global change necessitates the exploration of new and alternative approaches to the way we govern natural resources.

The present study seeks first to consider the primary hypothesis, to understand whether and how water and its management can contribute to or constrain regional integration. Only once that is answered can the question of how best water can be governed and managed be addressed.

A structured approach is important because it quickly becomes clear that much of the current discourse has been dominated by normative approaches to environmental issues, often driven by interests external to Africa. While those voices should be heard and considered, the case for a particular approach should not be made by repetition and, sometimes shrill, advocacy but by consideration of the objective circumstances, which is what we attempt to do in this study.

Purpose and Methods

Purpose

To test the hypothesis that "water is a driver of regional integration" using an empirically oriented framework and then to consider how best water can be governed and managed at different scales in Southern Africa to support the achievement of the goals of regional integration and socio-economic development.

Methods

This study covers an extremely wide range of disciplines, from aspects of hydrology through political science, international relations and public administration to finance, trade and resource economics at national and regional[1] scales, with consideration of relevant issues in economic "sectors" which use water such as power, agriculture and urban and industrial services.

In addition, many underlying social and environmental issues have to be considered in order to gain an understanding of the political economy of policy formation and decision-making and the broad development context. The challenges that this broad scope presents relate both to the assembling of sufficient information to provide the insights sought as well as to the selection of appropriate and compatible or complementary analytical frameworks and developing them into a coherent whole. A structured approach was used that considered:-

- the relationships between water and socio-economic development at local, national and regional levels and how these have changed over time;
- regional integration at global as well as African and SADC levels, considering both theoretical frameworks as well as practical approaches adopted; and
- evolving approaches to the governance and management of water resources, with a particular but not exclusive focus on transboundary water resources.

On the basis of this information, an analysis was made of:-

- the potential linkages between regional integration and water; and
- the institutional architectures that have been adopted or proposed to optimize the contribution of water to regional integration.

Given the wide scope of the research and the limited resources available, this required a combination of methods.

[1] Note on terminology: the concept of region has many meanings in different contexts beyond the description of a group of sovereign countries. These include regions within single countries as well as regions defined by criteria other than political boundaries. The different concepts of regionalism and their implications are discussed below.

Literature reviews

Literature reviews were undertaken on the relationship between water and development; approaches to regional integration; approaches to water governance and management; and the contribution of water resource development, management and use to regional integration. A global perspective was taken but with a particular focus on Africa in general and Southern Africa in particular. It was not the intention of these reviews, nor was it possible in the scope of the present research project, to cover these fields comprehensively. What has been attempted is a structured sampling of the literature to identify materials that are relevant to the focus of the current research.

By its nature, much of the academic research in these areas draws on often contested paradigms about the nature of development and democracy, the contribution of natural resources to development, the politics and economics of regional interactions, the nature of institutions and their dynamics as well as diverse perspectives on environmental governance in an Anthropocene age. One challenge has been to extract the empirical information that has nominally underpinned theoretical analysis and to disentangle local preferences and perspectives in empirically based work that is presented as being of global application.

Interviews with key actors and other stakeholders

A number of key actors in regional integration as well as water resource management at national and regional level were identified for interview. This included government, private sector and civil society perspectives. Both formal and informal interviews were conducted and advantage was taken of engagements during other processes to raise relevant issues.

The primary beneficiaries of water resource development are water users in other sectors while other sectors of activity often have an impact on water resources. Key actors in such sectors who, it was considered, might also have an interest in regional integration were identified and interviewed. A project-specific workshop was organized on the sidelines of a water conference held in Mbombela, South Africa, to consider the case of the Komati River which is shared between Mozambique, Swaziland and South Africa.

A list of persons interviewed is attached as Annexure 2.

Liaison with related processes and participation in relevant events

Given the limited resources available for the project, advantage was taken of opportunities presented by the engagement of the researchers in other activities. These included work with the African Development Bank on the contribution of transboundary management to regional integration, the World Bank's Cooperation in International Waters in Africa (CIWA) programme as well as engagements with the planning and institutional development of river basin organisations. In addition, researchers participated in regional and international conferences on related matters including the 2014 African Water Week, the 2014 meeting of the African Ministers Council on Water, the Annual Meeting of the African Development Bank and a meeting of the Nile Basin Development Forum. Relevant academic conferences attended included that of TRALAC (Trade Law Centre) on the politics of regional integration, the 4th Annual Conference of the Institute of Social and Economic Studies (IESE) on the "State, natural resources and conflict: actors and dynamics, Maputo 2014), WISA-2014 and the CRIDF (Climate Resilient Infrastructure Development Fund) workshop to review the potential contribution of Virtual Water and Water, Food and Energy Nexus thinking to the achievement of SADC's vision and Goals.

The project also built on and benefitted from engagement with a wider programme of activities involving the South African National Planning Commission, the Development Bank of Southern Africa

and the SADC Secretariat, including an initiative to promote greater intersectoral coordination across the region by developing an informal network of national planning agencies. (NPC/DBSA 2012; DBSA/GWP 2012).

Structure of the report

The structure of this report follows the logic inherent in the hypothesis that water is a driver of regional integration in Southern Africa.

Water and development

It starts by outlining the linkage between water and social and economic development across time, geography and in different dimensions of human activity.

Regional integration

Next, the nature of regional integration is interrogated, since the goal of bringing more people and countries to work together is to enhance their welfare, through development. It is necessary to understand the processes and objectives of integration to know whether water can contribute to them. Again, the concepts are illustrated by considering some examples, with a particular focus on cases with an environmental dimension which may be relevant to the role of water.

Water management approaches

With a recognition of the ways in which water contributes to development together with an understanding of the objectives of regional integration and how they are pursued, the focus turns to how water is managed since different approaches to water management may contribute more or less to processes of regional integration. A few global examples are given of the more or less explicit use of water management interventions to support regional integration objectives.

Regional integration in Africa and Southern Africa

This section considers in more detail the approaches to and experience of regional integration in Africa generally and Southern Africa specifically.

Water resource management in a Southern African regional context

This core section considers the evolution of water management from the colonial period with particular focus on its regional dimensions. Since in the past two decades water management has been the explicit subject of the wider processes of regional integration that are underway, this begins to address directly the interplay between the actual approaches adopted to water management and their engagement with regional integration.

Water and regional integration in Southern Africa

With this background, a final set of information is provided regarding the current and potential dimensions of key water resource related activities of regional significance. This then provides the basis for the final section.

Discussion/Analysis, conclusions and recommendations

Background

Water and development – A quick historical perspective

Before considering what impact water and its management can have on regional development and integration in Africa generally and Southern Africa in particular, it is first necessary to demonstrate a linkage between the availability of water and social and economic development at different scales. This linkage has long been identified, by a variety of scholars. The argument is well summarized by Priscoli:

> "The history of social organization around river basins and watersheds is humanity's richest record of our dialogue with nature. It is among the most fertile areas for learning about how the political and technical interact. The spatial and functional characteristics of the river basins influenced human settlement and interaction long before the idea of the river basin started to be formalized into legal and administrative terms. The direction of flow of rivers influenced the movement of civilization. Rivers have been crucial to means of communication leading to the formation of political units." (Priscoli 1998)

There is certainly extensive evidence that early state formation and related social and economic development was closely associated with human use of water for irrigation. Aside from the familiar examples of ancient Egypt (a relevant popular account is provided by Hassan (2005)) and Mesopotamia (a more nuanced situation, as presented by Adams (1966)), China, Sri Lanka and Andean societies are frequently cited as examples.

Before becoming embroiled in cold-war oriented political debate about "Oriental Despotism", Karl Wittfogel, who coined the term "hydraulic societies"(Wittfogel 1957), also distinguished between different forms of social and economic organization that arose in places with different topographic and hydrological circumstances. Although the simplistic over-emphasised determinism inherent in some of Wittfogel's early work was criticized (Needham 1959), he later distinguished between hydraulic societies, in which the form of the state was determined by the need to manage large expanses of land and water, and hydroagricultural societies, in which local water development produced decentralized communities that typically gave rise to feudal societies (Price 1994). The close relationship between water management and use and the formation of state institutions has also been documented from a legal perspective, such as Caponera's (1992) review of early systems of water regulation and management.

The notion that water, its management and use can contribute to economic and social development has also been embedded in mainstream economic thinking. When Adam Smith sought to understand why some countries made economic progress while others stagnated, he concluded that water was a key factor – although then, his focus was on the economic advantage offered by easy navigation. He specifically suggested that the reason African societies had not developed was the relative absence of navigable waterways (Smith 1776).

The historical importance of shared rivers for navigation is demonstrated by the priority given to developing legal frameworks to govern this activity, which significantly predates agreements between states over other dimensions of water use. For example, an early action of the 1st French Republic was to open international rivers for navigation. In 1792,

> "…. the Executive Council of the Convention decreed the liberalization of the Scheldt and the Meuse stating that the obstacles and hindrances to the navigation of and trade in Scheldt and Meuse are directly contrary to the fundamental principles of natural law that all Frenchmen promised to respect. In 1804, the Paris Convention adopted the principle of

> freedom of navigation on the Rhine, the most important international river in Europe. It asked for co-administration of riparian access. The solution this Convention proposed was regional and particular in form. "

Navigation rights on shared rivers were subsequently an integral part of the grand settlement between France and the other great European powers reached at the Congress of Vienna.

> "According to the Treaty of Paris of 1814 and the Final Act of the Congress of Vienna of June 8, 1815, the law of rivers aimed at ensuring navigation of upstream countries for free access to the sea. Article 5 of the Paris Treaty on the Rhine (May 30, 1814) emphasized free access to the sea: "The navigation of the Rhine from the point it becomes navigable up to the sea and vice versa shall be free in such a way that it shall be prohibited to none." (Uprety 2006)

While the earliest examples of river-focused development were based on agriculture, supported by navigation, the role of water to power a range of industrial activities is also ancient. In China, it dates back to pre-Christian periods and to the 10th century AD in Islamic countries (for a detailed review, see Lucas 2005). Water powered technologies developed in Europe in medieval times and by the 18th century, there was a rapid expansion of water use for industrial purposes – power, cooling and cleaning – as well (Agnew and Woodhouse 2010).

> Agriculture and industry were connected, with linkages extending across the world. So India was historically an important producer of cotton, a significant proportion of which was produced under irrigation. That irrigation was undertaken on a large scale and its products were central to the country's economy. "Gravity flow irrigation has been central to Indian social history. … in 1890, the region had 12 million hectares (ha) of irrigated land compared with 3 million ha in the United States, 2 million ha in Egypt, 1.5 million ha in Italy and a few hundred thousand ha each in Ceylon, France, Spain, and Victoria (Australia). Although Egypt and Sri Lanka are better known as hydraulic civilizations, a century ago British India was arguably the world's irrigation champion. (Shah 2011)

In the first half of the 19th century, much of the cotton that was processed in Britain's water-driven mills came from India where industrial production had declined for a variety of reasons, not least the steep tariff barriers imposed by Britain, even as India's irrigated production increased (Akamatsu 1962).

This irrigation development was not simply a colonial innovation. In fact, as (Chaturvedi 2012) notes, "most of the early British schemes were, in fact, rehabilitated and extended versions of indigenous works found in various parts of the country". But a major programme of colonial expansion was undertaken in the 2nd half of the 19th century, driven by drought, famine and threats of revolt as well as early hopes of profit. Although private efforts yielded poor returns, it has been estimated that public colonial investment in canal irrigation consistently yielded an 8-10 percent return on investment (Shah 2011). This was an example of a regional restructuring of production in which colonial policy created a role for agriculture, enabled by irrigation, but captured most of the value in the downstream processing of the product. As documented by Akamatsu, while this could be seen as an example of the establishment of an efficient international division of labour, many regarded it as an exercise in regional underdevelopment and disintegration, of imperialism.

While the exploitation of water resources made a fundamental contribution to early economic and social development, indeed to the evolution of human society and political organization, the relative importance of that contribution has declined since the initial stages of the western industrial revolution. This was a reflection of the decline in importance of direct water power, as opposed to

hydroelectricity generation, as a result of the development of steam power. The evolution of alternatives to water-based transport had similar impacts.

This decline is illustrated by the objections made to Britain's 1878 Factory Consolidation Act, which set labour standards for industrial workers. The provision to set maximum working hours was objected to by the owners of water powered textile mills who complained that:-

> "These mills are already placed at a great disadvantage from their distance from towns and markets…. Requiring in some cases as much as fifteen miles of cartage to their warehouses and depots …. where time is lost from drought or flood, the workpeople are uneasy and chafe at their loss of regular wages and employment , and frequently leave and migrate to the towns for the benefit of regular work and wages which steam power ensures for them" (Greg 1878).

The historical record thus shows that water resources have long played a deep and diverse role in societal development but also that this role has been transformed by ongoing processes of social, economic and technological change. Developments in the 20th century reflect this.

20th century experience

In the 20th century, water-based development continued to play an important role in specific locations for specific purposes. The notion that water could be a driver of development was exemplified by cases in the USA where, at the turn of the century, the construction of large water schemes, funded by the sale of state land, enabled a systematic process of agricultural expansion and urban development in California and other Western states:

> "All moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming … shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund;' to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands in the said States and Territories…" (USA 1902)

Other schemes were developed to provide power in Washington State; power and navigation to support industrialization on the Tennessee River and to improve navigation and flood control on the Mississippi, which was the main means of transport for key agricultural and industrial products in the central USA (Agnew and Woodhouse 2010).

USA – Tennessee Valley Authority (TVA)

Many of the later interventions in the United States were cases where water resource development was explicitly used to promote economic activity in depressed areas. Because it became a flagship example of "water for development", the case of the TVA (Tennessee Valley Authority) merits particular attention. It is widely presented as an example of a river providing both the resources and the geographical framing for an economic initiative. Yet the origins of the Tennessee Valley project were more mundane. It began with the federal government attempts to dispose of a hydropower plant and two nitrate factories that had been developed as part of the 1st World War effort (nitrate has dual use for explosive and fertilisers). The decision was delayed for 15 years while arguments raged about whether government or private companies should be producing and distributing fertilizer and electricity. A decision was finally taken when President FD Roosevelt was elected in 1933 with a mandate to address the social and economic challenges of the Great Depression and

chose to solve the problem by incorporating the contentious factories into a much larger economic development programme.

> "…. what began as, and what was generally understood to be, primarily the solution of a problem of fertilizer and power emerged as an institution of far broader meaning. A new regional concept -- the river basin as an integral unit -- was given effect, so that a government agency was created which had a special responsibility neither national nor state-wide in scope. This offered a new dimension for the consideration of the role of government in the evolving federal system. … in one sense most important, a broad vision of regional resource development -- in a word, planning -- informed the conception, if not the actual powers, of the new organization." (Selznick 1949)

The irony, as is discussed in more detail below, is that a panel of development experts and economic geographers had strongly recommended to the President that river basins should **NOT** be used as the geographical units of economic as development regions. (Meyer and Foster 2000) This was a clear case in which political considerations had to override the technical.

The system, still managed by the TVA, finally comprised 113 hydropower plants with a generating capacity of almost 6000 MegaWatts (TVA 2005). But the TVA involved more than electricity production and was portrayed as a case in which water resource developments unlocked a wider range of economic and social developments. It also entailed engineering a way past the Muscle Shoals to link the region to the larger Mississippi river navigation system. Beyond that, the goal was to make a transition from an environmentally devastated and socially deprived rural region to a semblance of prosperity and modernity. Local conditions

> "…required a diversification of its economy as a prerequisite for improving the well-being of its people. Building a strong nonagricultural base was considered a key element in the resource conservation and development program … An increase in nonagricultural jobs would alleviate the destructive pressure on the region's soil due to the overintensive use of marginal land. … Without industrialization, the people of the Tennessee River valley would continue to mismanage their land not simply as a matter of neglect but as a matter of economic necessity. … The question then was not whether to industrialize but rather what industries the region should encourage and support. … Industrialists had been attracted to the valley because of its growing supply of hydroelectric power, its cache of natural resources, and its cheap, non-unionized work force."

In 1930 local wages were only 65% of the US average. But that also reflected the nature of local industry. Textiles, wood products, and chemical processing accounted for 70 percent of all employment in manufacturing.

> "These resource-based industries, requiring predominantly non-skilled laborers, represented the types of manufacturing concerns that the region hoped to continue to attract, only in much greater numbers; industries that would process the valley's natural resources into finished products and would enable the valley to capitalize on its most immediate assets. Instead of exporting its natural wealth to the North, the valley would utilize its resources to diversify its economy and to increase nonagricultural jobs."

And all this was to be catalysed by developing the water resources (Schaffer 1984). Eighty years later, the outcomes are still being debated but the consensus is that the programme significantly improved employment and incomes in the region although some of the improvements came at the cost of slower development in other regions (Kline and Moretti 2013; Kitchens 2014).

But the TVA became the model for the USA's support to developing countries, informing the construction of Egypt's Aswan High Dam and China's Three Gorges as well as proposals to develop South East Asia's Mekong River and many others. Molle (2008) has described the importance of this "iconic model":

> "Most third-world elites were all too eager to accept a model that promised to spread modernism and progress to their newly independent countries, while strengthening their legitimacy through the provision of iconic and politically rewarding projects. The TVA model well befitted conventional state paternalism and massive state investment in river system infrastructure and technology: river basin development would generate significant amounts of hydroelectricity to power developing economies, help control flood damage, bring prosperity to rural masses, and thus contribute to modernization and state-building."

Elsewhere in the USA, aside from its role in addressing the impact of the Great Depression, water resource development was variously promoted as a contribution to powering the industries on the Pacific coast that were to underpin the 2nd World War effort, enabling the emergence of major agricultural industry in California as well as supporting urban development in California and the arid south west of the country; this was in addition to its navigation role. (Agnew and Woodhouse 2010).

Managing water to create a nation: Netherlands

The Netherlands provides a different perspective, that of an entire country whose history and development, indeed, whose very existence, was directly enabled by water resource management. In this case, however, the focus of water management was on flood protection and drainage. The importance of these is demonstrated by the fact that 26% of the country is vulnerable to floods from rivers and while 29% of the country lies below sea level. As a consequence, a great deal of Dutch public policy, whether about local administration, industrial policy or environmental protection continues to be strongly influenced by water resource management considerations (OECD 2014).

The detailed technical and institutional history of how the inhabitants of the lowlands slowly reclaimed land from the sea, starting around 750 AD, is well documented in Borger and Ligtendag (1998) although the authors acknowledge that it is not clear why people should have chosen such inhospitable areas which required so much labour to settle. "The fact that the best lands on the higher sandy soils in the east were already taken, combined with the fact that, in the peat area the population would be virtually free from feudal duties and rules must have had something to do with it" the authors suggest. An important characteristic of this development was thus that, unlike many of the earlier hydraulic civilisations, much of the initial Dutch land reclamation and maintenance was undertaken voluntarily and under local organization.

One consequence of this type of development was that "the increasing costs of water management forced people to look for the most profitable ways of land use" (Borger and Ligtendag 1998). A result of this focus on intensive agriculture has been that the Netherlands remains an agricultural economy with agriculture-related activities accounting for 10% of GDP, exporting agricultural products to the value of Euro76.2 billion in 2011, although a proportion of this reflects trade rather than local production (Berkhout et al. 2013).

During the first half of the 20th century, the reclamation of land from the sea continued. But since the flood disaster of 1953 when sea defences were breached and nearly two thousand lives were lost, a period consolidation occurred. The focus eventually shifted to securing the land already reclaimed through major engineering works and then, latterly, to establishing a more sustainable

balance between man and nature (OECD 2014). The challenge is not to manage the water to create space for development but to create security that enables the development to continue.

China and Australia – more use of water for regional development

China has a long history of water development enhancing local economic development, as epitomised by the 2300 year old Dujiangyan irrigation scheme which still serves over 600 000 hectares (Li and Xu 2006). A more recent example of water resources being developed in support of regional development and integration are the projects in the Yangtse river basin, culminating in the construction of the Three Gorges Dam, focused on flood protection, transport and hydropower, which are being undertaken with explicit integration objectives, seeking to achieve more balanced regional development within the country (Muller and Yang 2009). Similar development is occurring in other river basins, focused principally on harnessing their hydropower potential but also supporting irrigation and urban supply, mitigating floods and, increasingly, environmental protection.

In Australia, water resource developments in the Murray Darling Basin have transformed the rural society and contributed to the country's emergence as a major agricultural producer over the past century.

> "The expansion of irrigation relied heavily on the creation of inter-annual dam storage, with the completion of the Hume dam on the Murray in 1929, and the creation of the Snowy Mountains Hydroelectricity Scheme from 1949 to 1974, which includes inter-basin transfers to the Murray-Darling system from a network of 16 dams and seven power stations, linked by 275 km of underground tunnels. In 1998, the total irrigated area of Australia was about 2.4 Mha, of which about 80% lies in the Murray-Darling basin. Approximately 70% of all water abstracted in Australia is used for irrigation in the MDB." (Turral et al. 2011)

As Shah (2011) and Turral et al. (2011) note, the Australian developments were influenced by the example of irrigation in India, which the then-Prime Minister visited on a number of occasions.

Water as a pathway to modernity – the age of the hydraulic mission

By the 20th century, the concept of water as a driver of development and modernity was exemplified by cases such as these and the approach, described in more detail below, characterized as the age of the "hydraulic mission" (Allan 2005;building on Swyngedouw 1999). Its political significance was highlighted by US President JF Kennedy who described the TVA as "the best ambassador that the United States has ever had in the Middle East and Africa and Asia. If we want people to follow us, we have to lead …. It is one of our nation's greatest assets, not only for what it has accomplished for the Tennessee Valley and for the nation, but also for its great contribution to the free world's efforts to win the minds of men" (TVA 2014). The assumption is that the world's poorer majority still aspires to the benefits of the "modernity" of more economically developed countries, even as the desirability of that goal is increasingly challenged in those countries.

The idea that harnessing water resources can stimulate broader economic activity remains at the origin of current discourses about water and development, in an often simplistic if not romantic form, whether citing early civilisations, whose boundaries were often determined by economic activity delimited by access to water or more recent cases where water development opened new "regions" transcending previous political boundaries (even if these were only local). It has appeared logical to suggest that water development can build new political dominions and support supranational regional development and for cooperative cross-border water projects to become symbolic of regional integration.

Yet the conditions of the 2nd millennium are not the same as those that prevailed at the start of the 3rd. There are many alternatives to inland navigation as a primary means of bulk freight transportation in many parts of the world. And water is no longer a unique source of physical power. It was overtaken very early in the European industrial revolution (see Greg 1878) by thermal energy sources which have proven to be of far wider general application, not least because fuel and electrical energy are easier to transport and not dependent on favourable topographies. Meanwhile, new technologies that tap nuclear power and sources of energy such as sun and wind challenge the current predominance of hydropower as the primary source of clean (CO2 free) and renewable energy respectively although hydropower continue to have an important role in future, not least to stabilize electricity generating systems with increasing proportion of less reliable renewables. In developed countries at least, although agriculture may still be the largest user of water, it accounts for only a small proportion of economic activity and food security has been achieved through trade and finance instruments that compensate for variability in water availability (Allan 1998).

Nonetheless, water remains essential for socio-economic development, since so many economic activities require water for their processes as well to sustain the communities in which they are based. And agricultural development is still seen in many developing countries, including the Southern African region, as an important driver of economic development (SADC 2013a).

While acknowledging these perspectives on the historic contribution of water to **regional economic development**, the present study addresses the more limited question of whether there is any evidence to show that water resources still have a significant role to play in the promotion of **regional integration**. To do this, modern conceptions of how water may contribute to different economic sectors, to national and then regional development and thence to integration are considered, illustrated by selected, spatially focused, cases.

But it is first still necessary to consider in a little more detail some of the dimensions in which water currently contributes to, or constrains, socio-economic development.

Dimensions of water and development

Introduction

Almost all social and economic activities are underpinned in some way by the use of water. The United Nations system, through its World Water Assessment Programme and coalition of agencies in UN Water publishes a triennial World Water Development Report which provides a good overview of the diverse water uses and their trends as well as the approaches being taken to meet emerging demands (WWAP 2014).

However, in order to consider the interaction between the different uses and how may be managed to contribute optimally and effectively to the achievement of development objectives, it is helpful first to gain an insight into the different water using sectors and the particularities of their water requirements. This prior disintegration of focus can then inform a coherent, better integrated, synthesis.

Agriculture

Although the majority of agricultural water use is of "green water" (rainwater that is intercepted by plants or stored in soil), this study is primarily concerned with what is characterized as "blue water" (which flows in surface or underground watercourses). At a local level, some crops and cultivation techniques can significantly reduce the amount of "blue water" that enters the system but this is a relatively small proportion on a national, regional or global scale.

Formal irrigation, based either on the direct abstraction from rivers or underground, or the storage of water in reservoirs and its transmission to fields where it is applied, accounts for as much as 90% of "blue water" use in many developing countries although this is lower in countries with temperate climates and/or relatively high levels of social and economic development which use water for other purposes.

In many parts of the world, a reasonably productive agriculture is only possible where a supply of "blue water" is available. Even in locations where average rainfall is adequate for crop production, complementary irrigation is often used to cope with rainfall variability during critical phases of crop growth. Perhaps the most important characteristic of agricultural water use is that it is strongly seasonal and location bound and often requires extensive infrastructure development to deliver the volumes required while enabling the degree of flexibility and control required.

Irrigation has to be underpinned by social and economic institutions; in turn, it enables production of be maintained at a level that allows the subsistence if not prosperity of large numbers of people. One consequence of this is that production may continue and expend in its traditional areas, taking resource use to and sometimes beyond its sustainable limits. It is for this reason that physical water scarcity is growing in South and East Asia.

With demand for food and other agricultural products growing even faster than global population, this has led to concerns about whether there will be sufficient water to meet future needs at a global level. The International Water Management Institute's Comprehensive Assessment of Water Management in Agriculture considered whether water availability will constrain the world's ability to produce enough food to meet the needs of future populations:

> *"Question*: Is there enough land, water, and human capacity to produce food for a growing population over the next 50 years—or will we "run out" of water?
>
> *The Comprehensive Assessment's answer*: It is possible to produce the food—but it is probable that today's food production and environmental trends, if continued, will lead to

> crises in many parts of the world. Only if we act to improve water use in agriculture will we meet the acute freshwater challenges facing humankind over the coming 50 years" (IWMI 2007).

The large proportion of available water used by agriculture together with its seasonal requirements mean that, in many regions, a strategic response to growing water use will be to achieve greater efficiencies in water use as well as greater reliability in supply through the development of storage infrastructure. In other regions, production will have to be shifted, by policy and/or market forces, to the many areas of the world where water and suitable land is still available. While this is technically feasible (see Duchin & López-Morales 2012.), the political, social and economic implications are substantial. This has given rise to an extensive literature on the trade in food as a mechanism for addressing local water scarcity, otherwise described as a trade in virtual water (Allan 2005; Antonelli and Sartori 2014).

One consideration that has emerged strongly since the publication of IWMI's Comprehensive Assessment has been about the potential impact of climate change. The emerging consensus is that this does not, in itself, change the conclusion – again, provided the right adaptive measures are taken:

> "…. throughout sub-Saharan Africa, the greatest need for storage was in the Sahelian zone, the Horn of Africa, and southern Africa, with local hot spots of need in southern Angola, Rwanda, Burundi, and Uganda, as well as in Malawi and Mozambique. In Ethiopia and Ghana, the greatest need was not in areas with the least rainfall as might have been anticipated, but rather in the areas with the highest population densities (McCornick et al. 2013).

Communication/Navigation

The use of natural and man-made water courses for the transport of goods was one of the early contributors of water to economic development. These uses require that water levels in inland waterways are managed to maintain navigability which, in some rivers, can present major challenges. The development of networks of inland waterways may also substantially change the availability of water in other parts of the system. In addition, the need to build infrastructure to manage water levels and maintain navigable channels can aggravate the impact of floods. The importance of inland waterway transport is location-specific. It remains very significant in parts of Europe and the USA as well as in China. Elsewhere, there are specific reaches on the Nile and Congo in Africa, the Amazon and the Plate in Latin America and the Mekong in South East Asia where it plays a strategic role. While goods transported using this mode in OECD countries increased by almost 80% between 1970 and 2000, there was a significant easing in the following decade (OECD/ITF 2012)

Navigation on rivers and other waterways shared by more than one country is particularly important for landlocked countries. A formal legal framework has evolved to address these needs and, in many parts of the world, formal agreements about the navigational use of inland waterways predated those for other water uses. The 1965 Convention on Transit Trade of Land-locked States (UN 1965) established rules allowing landlocked countries to transport goods to and from seaports, giving landlocked countries a right of access to and from the sea without taxation of transit traffic and impose other obligations on both land-locked and coastal states that ratify the treaty. The provisions of the 1965 Convention have effectively been incorporated into the more general United Nations Convention on the Law of the Sea. (UN 1982)

Coastal states that ratify the Convention (known as "transit states") agree to make arrangements with land-locked states that are party to the treaty that wish to transit goods across the territory of the transit state to or from a coastal port in the transit state. The transit states agree that they will not discriminate based on place of origin or destination of the goods being transported. The land-locked states agree to be responsible for any expenses that the transit states incur in supervising or protecting the transit of the land-locked state's goods.

Energy

As already noted, water has been used as a source of power, harnessed directly through technologies such as water wheels that are connected to production equipment or indirectly, through the generation of electricity. This water "use" does not involve the consumption of water (except to the extent that they may result in additional evaporation from associated reservoirs) but rather the extraction of the energy inherent in water's flow through a descending topography. This flow and topography may be either the natural flow of a stream or flow regulated by a reservoir that changes the topography to enhance energy generation.

In addition to these non-consumptive uses of water, many thermal energy generation systems use water for cooling. In some cases, similar volumes of water are returned to the stream from which they are abstracted, albeit at higher temperatures, which can have environmental consequences. Where evaporative cooling is used, the water abstracted is discharged to the atmosphere and lost to the stream.

Although it has been contested by environmental interests over the past two decades because of its impact on the aquatic environment, hydropower's role is widely acknowledged. It:-

> **"…** has helped shape and promote economic growth in such countries as Canada, Norway, and the United States. Environmental and social concerns, coupled with financial constraints, resulted in a decade of stagnant investment in the 1990s and critical assessment of the role of hydropower in development. Now, lessons from the past, together with emerging global dynamics, are recasting the role of hydropower and stimulating a renaissance in investment and rehabilitation. …
>
> There exists abundant physical and engineering hydropower potential in developing countries. In absolute terms, the total economically feasible potential hydropower capacity in developing countries exceeds 1,900 GW, 70 percent of which (1,330 GW) is not yet exploited. This is nearly four times the current installed capacity of 315 GW in Europe and North America, and not quite double the 740 GW installed worldwide. (World Bank 2012)

Although scope for expansion in developed countries is limited, because much of the potential has already been developed, further expansion of hydropower elsewhere is likely, given the need to reduce CO2 emissions and increase the generation of "clean" energy. The rationale has been outlined by the International Energy Agency:

> Hydropower is a mature and cost---competitive renewable energy source. It plays an important role in today's electricity mix, contributing to more than 16% of electricity generation worldwide and about 85% of global renewable energy. Furthermore, it helps stabilise fluctuations between demand and supply. This role will become even more important in the coming decades, as the shares of variable renewable electricity sources – primarily wind power and solar photovoltaic (PV) – will increase considerably. The contribution of hydropower to decarbonising the energy mix is thus twofold: the primary

> benefit is its clean, renewable electricity. The secondary benefit is as an enabler to greater contribution of other renewables on the grid.
>
> Hydropower development often contributes other benefits. The most important are water supply, flood and drought control, and irrigation; but navigation and recreational activities also have their place. These objectives can conflict at times, but are more often complementary. Providing such multiple outcomes from sustainable hydropower development is central to this roadmap. (IEA 2012)

Contrary to widely promoted suggestions to the contrary, a careful review of climate predictions and hydrological circumstances has suggested that the output from the world's current hydropower installations will not be significantly affected and may even rise slightly although there will be local variations. In Africa, Eastern African shows increases except in Ethiopia where climate models disagreed; Southern and Northern regions show decreases, but by less than 1%; while West Africa shows no clear results (Hamududu & Killingtveit 2012).

Supply to urban and industrial users

The requirements of water for human use are relatively small in volumetric terms in poor, rural communities but grow rapidly in richer, urbanizing societies. To meet the needs of large concentrated populations, extensive infrastructure is often required to collect, store and transport water to where it is needed on a reliable basis and then to remove, treat and dispose it once it has been used. (See WWAP 2012 and WWAP 2014 for a comprehensive review of the different challenges involved).

At a global level, urban areas are the sector with the fastest overall growth in water use (although the rate of growth for the generation of thermal energy is predicted to be even faster, this starts from a lower base). While this use is not just for domestic purposes, urban water requirements are often dominated by domestic consumption. One characteristic of water use in dense urban areas is that it is associated with the generation of large volumes of wastewater. While this poses immediate threats to water quality (WWAP 2009 and WWAP 2014), it also offers opportunities for reuse if the wastewater is collected and adequately treated. Reuse may be indirect (where water is returned and abstracted lower down a watercourse) or direct (where treated wastewater is fed directly into a supply system). In this sense, water is a reusable as well as renewable resource.

The use of water for industrial purposes is also growing, in parallel with economic growth. Industrial water use also generates significant quantities of wastewater whose composition is often more toxic and difficult to treat than for domestic wastes. However, while industrial water use may impact both on resource availability and quality, its cost is generally not a significant proportion of total costs in most industries and there is thus economic scope for impacts to be limited either by greater water use efficiency or by treatment before discharge.

Environment and sustainable development

The characterisation of the conservation of aquatic ecosystems as a water use and the environment as a water user is relatively recent and remains contested. Since aquatic ecosystems require the maintenance of adequate water flows to sustain them, provision has been made in the policy of many countries to provide for adequate "environmental flows" for the aquatic ecosystem (Dyson et al. 2008). A complementary perspective is that the aquatic environment is in itself a natural infrastructure that provides "ecosystem services" that contribute to other water users through flow regulation, water purification and flood mitigation (IUCN 2014). In a regional context, rivers provide

the basic connecting infrastructure that has to be built for energy, communications and road and rail transport.

If an objective of water management is to achieve conservation of aquatic ecosystems, the reservation of environmental flows is essential. On the other hand, the argument for treating the aquatic ecosystems as a unique infrastructure whose contribution to water management is in itself a justification for conservation is weaker and cannot be generalised. Thus, while wetlands may attenuate floods and provide a steady release of flows in dry seasons, they often do this at a significant environmental cost in terms of water lost through evaporation and greenhouse gases released to the atmosphere (Bullock and Acreman 2003). Taken to its limits, a rational policy approach might choose to use technical methods for the same services because they would have smaller environmental impacts.

A general assessment of the pressure imposed on aquatic environments by water withdrawals can be gauged from the proportion of total flows actually used. When abstraction on individual watercourses reaches 30-40%, sustainability issues arise. There is huge variation in levels of abstraction even at a gross, continental level where Central Asian abstraction is recorded as 56% while aggregate sub-Saharan Africa abstraction is 3% (WWAP 2014). Levels of abstraction are somewhat higher in Southern Africa, excluding the DRC but are still well below critical levels, even in South Africa where abstraction is estimated to have reached over 30% of average annually available water resource.

The challenge of integration, in water management

One of the primary challenges of water resource management is that, while many developments address the needs of a single sector or community, water resources are what is technically described as a “common pool resource” which are drawn on by a multiplicity of users. As demands on the resource grow, there is increasing interaction between uses and users, which needs to be managed.

There is thus an obvious requirement for a holistic approach to water resource management that takes account of the interactions and potential synergies between different uses and users. Once the extent of uses, in their broader sense even including “non-use” (preservation for aesthetic, recreational or related reasons) increases to the point that there is competition or conflict between different uses, they must be considered and regulated as a collective set of demands on the resource, through some form of “integrated” management. A wide variety of approaches have been proposed to achieve such integration under the broad description of Integrated Water Resource Management (IWRM). This has been the subject of much contention; Mukhtarov and Gerlak (2014) have made a thoughtful review of the issues and proposed a way forward in the debate which is described in greater detail in the section below on approaches to water resource management.

However, for the purposes of this study, before addressing the management of water resources it is first necessary to consider the nature of the objective which is not simply to support social and economic development but, in this case, to contribute to regional integration.

Regions, regionalism, regional cooperation and regional integration

Since this study seeks to understand the contribution that water resources and their management may make to regional integration, it is also necessary to understand the conceptual basis of, and practical experience with, regional integration. To this end, the literature has been reviewed and the experience with integration in a number of different regions is considered in order to provide some insights into the different objectives, approaches and outcomes, with specific relevance to the African context. [2]

Traditional theoretical approaches: functions or institutions, politics or economics?

There are two dominant theoretical approaches to regional integration, those that derive from a political perspective and those that focus on the economic. While the two approaches are closely linked, it is helpful to consider them separately, particularly since both have deep but different histories in African theory and practice.

Early political economy approaches to regional integration were characterized as "**functionalism**" and originated in 1940s thinking about how to avoid another world war. Mattli (1999) cites Mitrany (1966) as the main proponent, believing that "the problem of our time is not how to keep nations peacefully apart but how to bring them actively together." Mitrany suggested that there could be no overarching formula for integration but rather that a functional approach was needed. "Any political scheme would start a disputation; any working arrangement would raise a hope and make for confidence and patience" he said, a comment that might find resonance in Southern Africa today.

The focus on peace meant that the approach was both value-laden and normative and could not as a theory address the practical challenges of a post-war world and the circumstances in other regions. **Neofunctionalism** was developed as an elaboration of the original concept to address these deficiencies and provide a paradigm of wider application. However, Haas (1961), one of the originators of this revised approach, cautioned against its application to developing country contexts and suggested that "…other regions with strongly varying environments are unlikely to mirror successfully the European example; because of thinner spread of core preconditions". According to Warleigh-Lack (2006), the well documented tension between functionalism and neofunctionalism failed to ultimately generate workable theories.

Intergovernmentalists portrayed integration as a sequence of interstate bargains triggered by a convergence of policy preferences among states; the purpose of integration within this discourse is to maximize states' wealth and power (Mattli 1999; Moravcsik 1991). Intergovernmentalism is often used as a theoretical attempt to describe the emergence of the EU. It emphasises the central role of member states in the EU integration process.

Transactionalism assumes that the level of communication, broadly defined, between states is a determining factor for integration. It argues there is higher potential for integration in regions with mutually high international transactions which can be easily actualised when states respond to one another. It views mutual responsiveness as a pre-requisite for integration (Duffy and Werner 1980).

Institutionalism emerged as a critique of intergovernmentalism (Laursen 2008). It assumes that institutions are crucial because they impact on political outcomes through providing contexts for the conduct of bargains. They also provide information and are intermediates between the preferences

[2] This section is summarises a literature review on theoretical approaches to regional integration prepared as part of the study (Chikwema S, Regional Integration: Annotated Bibliography, August 2013).

of actors and eventual policy outcomes (Aspinwell and Schneider 2001). Sociological institutionalism emphasises the cultural explanation of institutions (Pierson 1996; Hall and Taylor 1996).

Federalist theories are relevant when a group of actors commit to a set of specific objectives and plans. State centrism suggests that despite the integration, the EU still rests on nation states. Supranational institutions in the EU function as agents of the collective will of nation states leading to politicians playing both domestic and EU politics. Multi-level governance theory posits that European politics are transferred into a system of multi-level non-hierarchical deliberative and apolitical governance where decision making is done at various levels.

In practice, many of these theoretical approaches overlap and merge. In Europe, after a functional start, attention turned to the institutionalization of integration. In the Southern African region, where most states have shown little willingness to cede significant sovereignty, the early focus on **institutional at the expense of functional approaches** may reflect an ongoing intellectual and political engagement with former colonial powers. It may also be that relationships with former colonisers are seen to bring more immediate benefits than functional relationships with equally poor neighbours, although even the European Union emphasizes that greater African regional integration is necessary for effective Europe-Africa economic partnerships (Michel 2008).

In the absence of coherent and persuasive political paradigms for integration, **economic theories** have come to the fore and economic objectives are generally considered to be the major drivers of policy reform in support of integration. As Jovonavic (2007) puts it:

> "We can conclude that international economic integration is a process and a means by which a group of countries strives to increase its level of welfare. It involves the recognition that a weak or a strong partnership between countries can achieve this goal in a more efficient way than by unilateral and independent pursuance of policy in each country."

Specifically, it is posited that regional integration promotes trade and trade supports regional integration (Mattli 1999). The **traditional neoclassical theory** is that, as economic integration increases, barriers to trade between markets decrease. These economic theories focus on market driven integration processes, a rationale that has informed the customs union and currency area approaches.

The focus on economically driven processes has implications for the conceptualization and implementation of strategies for regional integration, specifically in respect of the identification of key actors. Traditionally – and still currently, in Africa – the **provision of infrastructure is seen as a driver** of integration, arguably requiring a functional rather than an institutional focus. This is not uncontested. The findings about infrastructure's contributions to development, while drawn from literature that focuses on the sub-national rather than national dimension, are ambiguous. Eberts (1990) provides a valuable overview of the arguments:-

> "… economic development depends primarily on locational advantage, whether it is between cities, states or countries. Firms seek areas that offer greater opportunities for economic profit. Public infrastructure can enhance these opportunities either by increasing productivity or by reducing factor costs: that is, by augmenting the efficiency of private inputs employed by firms or providing an attractive environment within which households are willing to accept lower wages in order to reside."

However

> "Regional and national economic growth depends on processes that are more complex than simply the aggregation of independent decisions of firms and households. The decisions of economic agents are inextricably intertwined, and this interdependent must be taken into account in order to explain the process of development. The traditional, neoclassical view of regional development ignores this interdependence and relies heavily on the notion that capital is perfectly mobile between regions."

Eberts proceeds to consider the interactions between public sector investment in infrastructure and private sector decisions, concluding that "The interdependence between public-sector investment and private sector investment is paramount to understanding the regional development process and for prescribing regional economic development policy." He also warns that infrastructure investment will often not be enough to trigger economic growth, incidentally supporting one of the arguments for regional integration:

> "…. the scale and spatial distribution of public capital may have a significant impact on subsequent private investment decisions and on the location decisions made by firms and households. Since the initial size and distribution of the public capital stock is at least partly predetermined by the prior spatial distribution of households and economic activities in the region, an interdependent system emerges. "Once growth in such a system is under way, the process can easily become self-sustaining and cumulative. However, if the initial population and level of activity are small, and their spatial distribution costly and inefficient, a region may remain in a low-level equilibrium trap."

This raises questions about the approach, typical for much of sub-Saharan Africa, to make public investments in a deliberate effort to promote growth. Eberts warns that "…we know very little about the generative impact of various types of public infrastructure on private investment decisions. Furthermore, we know little about the effect of a region's economic conditions on infrastructure's contribution to output". Regions with different endowments will respond differently. The danger is that, if an intervention is made in a "lagging region", which is characterized by a low standard of living due to small-scale agriculture or stagnant or declining industries "The economic situation offers little attraction to firms, and public infrastructure investment would have little impact." (In these debates, it is notable for the present study that almost all work on the impact of infrastructure development on regional economic development focuses on transport, communications and energy rather than water.)

The focus on infrastructure, often publicly provided, and the limited attention to the engagement of private sector economic actors has been identified as a practical weakness in Africa's efforts to promote regional integration:-

> "Interesting lessons from the Asian experience suggest that the role of the private sector is key – this should be a focal point for thinking creatively about regional integration. In Asia the flag follows trade; not the other way around as it still does in Africa, where state-led integration initiatives still predominate. If we leave the very important task of shaping a 21st century African integration agenda to states, we may miss the growth opportunities that Africa's new discoveries of resource endowments offer at present" (TRALAC 2014).

Similarly, the focus on large, state-led capital projects has tended to exclude smaller and less powerful interests with small and informal business and civil society often marginalized from the process (Söderbaum & Taylor 2007).

Institutional focus and the practical experience of integration

Many regional integration theories assume that all processes must end up in a definable institutional pattern. On this basis, the eventual emergence of Western Europe is cited as a successful integration process and the progress of other schemes of integration is measured against this benchmark. This leads some commentators to conclude that they have failed:

> "The traditional schemes that integrate developing countries, structured along the lines of the neo-classical theory of integration, have not lived up to the great expectations of their founders and most, in fact failed and collapsed." (Jovanovic 2007)

The assumption is often that if an integration process does not lead to such an outcome states will revert to the old situation of competing interests and sovereign powerful states will re-assert themselves. So according to Haas (1976), this creates choices in the outcomes of the integration process. These choices are either the process results in a federation of states, a return to sovereignty or the type of integration that exists in the European Community.

Haas finds this framework problematic because, depending on initial relationships, integration processes will either lead to increased harmonisation and coordination of policy or will founder and fail to be institutionalised. In an African context, Draper (2011) and Schoeman (2002) both question the notion that economics is the primary driver of integration and that progress should be measured against specific institutional benchmarks.

This leads to the argument that there is need to develop a context specific approach to regional integration, i.e. any regional integration efforts in a particular region should be influenced by the specific economic, political, environmental and cultural context of the region and that the EU model is not applicable to all contexts (Erll 2010; Draper 2011).

Mattli (1999) observes that within the economic theorisation, integration occurs not only economically (via monetary unions) but also politically as economic communities naturally evolve into political unions over time. He argues that market integration cannot be explained purely by economic theories, without reference to institutional factors.

An analysis of the process followed in Europe provides an empirical perspective. The current deep integration of the European Union's 28 countries began in 1951 with only 6 countries and a very limited scope compared with today's shared market, free movement of people and capital as well as extensive regional legislative sovereignty.

The integration of the European Union began as a political collaboration with the strategic goals of achieving security and prosperity. Early institutions, established after the 2nd world war, explicitly focused on **cooperation** as with the Organisation for European Economic Cooperation (OEEC), created in 1948 to administer financial assistance under the Marshall Plan. This went in parallel with the development of institutions to address military cooperation, which was the dominant concern as the so-called Cold War intensified (CVCE 2012). This history of the European Union carefully distinguishes between cooperation and integration:-

> …the **European Communities**, driven by France and Germany, came into being as **integration organisations**. Unlike cooperation organisations, within which sovereign states merely harmonise their points of view, integration organisations collectively exercise the powers attributed to them by the relevant Member States. This meant that the countries that acceded to the European Communities were prepared to transfer some of their sovereignty to a supranational body. In contrast, the Council of Europe, under pressure

> from the United Kingdom, was established as an intergovernmental cooperation organisation. Indeed, it was the fact that some members of the older organisation, the Council of Europe, wished to go further that led to the creation of the 'restricted Communities'.
>
> Within the Council of Europe, the desire of a small number of countries for integration made possible the adoption, in May 1951, of a text of a statutory nature providing for the creation of 'European specialised authorities', each of which would be equipped with its own powers in the economic, social, cultural, legal and administrative fields and other related areas and which each member state would be free to decide whether or not to join. The text was based on a 1949 initiative by the organisation's Consultative Assembly, which envisaged the creation of specialised authorities as an interim stage in the establishment of European Union.
>
> This 'indirect method' of seeking a European political authority, 'sector by sector', was proposed by French Foreign Minister Robert Schuman in a speech that he made in Paris in May 1950. Inspired by Jean Monnet, he envisaged placing 'Franco-German production of coal and steel as a whole under a common High Authority, within the framework of an organisation open to the participation of the other countries of Europe'. This 'concrete achievement' would begin by creating 'de facto solidarity', which would lead over time to a European federation (CVCE 2012).

Although African integration also began with a political union followed by an economic union (UNECA 2015), the early focus on establishing regional institutions may have distracted countries from functional opportunities for cooperation and integration. This may have contributed to the integration project's limited progress to date. Kumalo (2012) describes the process:

> "Since the end of the cold war, we have witnessed the emergence of a newer version of African regionalism, starting with the transition from the Organisation of African Unity (OAU) to the African Union, which was formally launched in 2002. From the start, African integration was to be achieved through Regional Economic Communities (RECs) as the building blocks for the envisioned African Economic Community (AEC).
>
> This new African regionalism is, as it were, a multi-faceted dimension, through which economic, political, social, cultural and, of course, developmental dimensions were, and still are, being pursued. It is a confederated approach of building common values, institutions and systems and the aspiration that African states will come to abide by values of democracy, human right and cooperation as captured in the founding documents like the Constitutive Act of the AU ….",

Against this background, there have been recent appeals for Africans to consider the lessons from elsewhere of more flexible and gradual processes, involving a wider range of stakeholders than simply national governments (TRALAC 2014). Elsewhere, South East Asia is identified as a specific example of a "new regionalism" that uses different forms of interaction, networked rather than institutionalized:

> "… in which 'social forces … create multiple political connections' (Katzenstein 1996, p146). Networked regionalism is assumed to be 'inclusive' (Katzenstein 1996, p125) and more effective than institutional structures in enhancing intra-regional engagement."

The “ASEAN way” is characterized by a

> “….preference for nonbinding agreements and a general reluctance to interfere in, or to direct in any authoritative way, the (environmental) practices of member states.” *(*Elliott 2011)

To a greater or larger extent, regionalization is also a subjective, cultural, process of how different people in a common space interpret their relationships. In many cases, the process will be interpreted both positively and negatively, as succeeding or failing, moving forward or stagnating. Trenz (2014) illustrates this with a set of alternative narratives about Europe today; the same could be done for other “regional societies”.

New regionalism and the nature of regions

Much of the literature about regional integration continues to focus on a state-centred vision with some national sovereignty ceded to regional institutions, and a set of political and economic activities performed within relatively stable geographies. However, thinking about regions has advanced considerably beyond this in many disciplines, giving rise to the concept of “new regionalism”. The discourse has a number of strands. An early initial interest was from the economic perspective, specifically about the impact of different regional configurations on trade patterns. In this model, new regions were still geographically bound; they were also dominated by large countries to whom small countries made concessions (Ethier 1998). In this view, the world was essentially composed of three regions, North America, Europe and the Asia-Pacific with which other countries had to engage. This engagement often took the form of the promotion of secondary regions, the Mercosur of Latin America as well as African economic communities.

Subsequently, other analysts have concluded that trading considerations remain a dominant force in the pursuit of regionalism, confirming that “competition for market access is a major driving force of the new regionalism” (Baccini and Dür 2012). Businesses occasionally organize themselves around “supply chain regions” while trade economists might consider areas production is concentrated as “commodity regions” for purposes of analysis.

However, even in the economic domain, it has also been pointed out that there are other forms of regionalism with Africa providing a variety of examples (Grant and Soderbaum 2003) and highlighting the extent to which less traditional actors are included or excluded (Söderbaum & Taylor 2007).

These examples highlight the need to look beyond what Bach describes as “the classic Euro- and state-centric representations of ‘regional integration’. These new approaches are not constrained to focus on the geographical boundaries of the nation state. According to another institutionally focused author, in the context of developed countries:-

> The expression new regionalism initially addressed the repositioning of the state and the politics of scale in the age of globalization. It was made for two rescaling process in Europe and North America: the governmentalization of metropolitan areas and supra state regionalization (Giraut 2011).

For the purposes of the present research, what is perhaps most important is the perspective of Harrison (2013) who notes that

> “…. it is not the privileging of one or other that is important, but recognizing how it is increasingly different combinations of these elements that seem to be emerging in today’s

> new 'regional world'. Here emphasis is being placed on a need to analyse how the different dimensions of socio-spatial relations (for example, territory, place, network, scale) come together in different ways, at different times, and in different contexts to secure the overall coherence of capitalist, and other, social formations.

One trend that Harrison notes, and cautions against (and is prevalent in discussions about water), is the assumption that territorial conflicts and overlaps can be addressed through "network" relationships.

> " …. the enthusiasm of policy-makers to adopt network approaches to regional governance leads to the construction of more networked forms of governance, which is then used as further evidence of networked spaces acting as autonomous political and economic spaces, thus elevating network approaches to a position of orthodoxy and fuelling further rounds of policy intervention."

This will sound familiar to practitioners of river basin focused water resource management who make a serious effort to engage with their various significant communities of water users as does Harrison' conclusion that, because:

> "… the emergent spatial strategy of networks is unable to escape the existing territorial mosaic of politico-administrative units, one begins to see the logic behind the need for ever-more-complex configurations in order to make emergent strategies compatible with inherited landscapes of sociospatial organization, and for new conceptual frameworks capable of theorizing the 'inherently polymorphic and multidimensional' nature of sociospatial relations. To this end, it suggests how going forward many of the answers to the questions being faced today around in what ways, and in what contexts, different sociospatial dimensions appear complementary, overlapping, competing or contradictory will be found at the interface between emergent spatial strategies and inherited landscapes of sociospatial organization. After all, and as one interviewee was keen to remind:
>
> > 'In terms of delivering and creating our regional strategies, we have to interact with the world as it is rather than the world as we wish it were.' "

As well as the challenges of territory versus network, state versus non-state, this analysis of the concepts of region and regionality shows that there are many dimensions, political, economic, cultural or more recently, environmental, in which peoples can identify themselves and engage, take decisions and act in boundaries that do not coincide with those of their nation states.

Environmental regionalism and governance: Watersheds and "problem-sheds"

The broader focus on different forms of regions and processes of regionalization, which cover a variety of geographical scales and a diversity of activities and actors, has relevance to the issue of water's contribution to regional development and integration since it raises the environmental dimension.

Environmental regionalism

The concept of environmental regions has a long, if not always explicit, pedigree. The geographical features of the natural environment, such as rivers and mountain ranges, are often used to mark the boundaries of territories for administrative and political purposes. With the growing priority of environmental issues, there has been growing attention to the possibility of defining regions according to their environmental characteristics.

This was investigated explicitly in a Harvard University project which sought to identify the change in the characteristics used to define "regions" between 1935 – when a study of regions as made to guide the economic interventions of the USA's New Deal – and 1998, when a similar study was undertaken with the expanded mandate of considering "the use of regions to advance environmental protection, use, and management" (Foster 2000).

The 1935 review was carried out during the Great Depression of the 1930s, when iconic river basin focused developments were considered as measures to boost the economy and address poverty and unemployment. A committee of experts, deliberated about how regions might be configured to support such socio-economic development efforts. In the 1935 discussions, it was also agreed that regional boundaries were necessarily arbitrary and would depend on the goals which were sought to be attained; there was, for instance, however some disagreement as to whether political state lines should be preserved or ignored. Drawn from a variety of disciplines, the experts found it difficult to agree and their deliberations had little impact on policy. However, one point of agreement was:

> "…. that 'except for a narrow range of development operations, the river basin is one of the poorest types of units which might be selected." (Meyer and Foster 2000)

This position was ignored by the Federal government since,

> "… for legal and constitutional reasons, however, river basin development was the path taken by much federal regional policy."

This explanation for this was that, in a strongly federal nation, river basins that crossed state lines provided a useful justification for central government to intervene in matters that might otherwise be considered to be the mandates of the state governments, which jealously guarded their limited sovereignty. In the specific case of the TVA, state support could continue to be channeled to the organization since the functions of navigation and flood protection were recognized as appropriate recipients of public funds, even when power generation accounted for 83% of the TVA's assets (Jones 1961),. "It was a definition stipulated within the TVA Act as a first order of business, as the agency was authorized 'to improve the navigability and to provide for the flood control of the Tennessee River.'" (Schaffer D 1984)

In 1998, a similar panel was convened to use the same methodology to consider how regions should be configured, this time including environmental management as an additional area of focus (Foster 2000). Once again, the watershed as a unit of environmental management was challenged:

> "The watershed (or river basin) … is the classic form of environmental region in past North American theory and practice. It has kept the allegiance of a number of the practitioners and theorists …. On the other hand, equating watersheds with environmental regions was flatly rejected by a number of respondents who saw the watershed as too restrictive a framework and even as an idea whose time may have come and gone.
>
> "Many respondents proposed to define environmental regions ecologically rather than hydrologically. To them, regions represented the co-occurrence and close, causal interrelationship of a number of different biophysical phenomena … within a given area and in combinations that set the region apart from other areas.

Relevant to the present consideration of water resource management and regional development and integration, a specific comment was that:-

> "Most of the definitions of ecological regions did not account for human variables, or included them only as forces needing to be regulated in order to prevent disruptions of the ideal ecological patterns."

This has relevance to the ongoing debate about the nature and operationalization of approaches to integrated water management. But the theoretical discussion is of wider practical import for an international non-governmental organization like the IUCN, which often focuses its work at a river basin level:

> "At the subregional level, some of the work we do in the Pacific, particularly in New Zealand, tries to follow the reorganization of local government boundaries around ecological boundaries (watersheds and coast lines). Generally at a smaller scale, we have worked a lot on river basin management and at landscape levels, particularly the forest in the Congo Basin is an example of that. Or on the Mekong River, where we try to focus on semi-economic or semi-ecological boundaries. That smaller scale has a complexity, where a regional approach works to an extent, but often the level of political integration is not there. In working on the Mekong River, for instance, the largest single factor that will affect that river is China, which is not very effectively engaged in the discourse" (Jackson 2011).

Regional environmental governance

The concept of environmental regions underpins the efforts to promote new forms of environmental governance by organisations whose objective is to ensure that environmental protection is given due priority at all levels, from local to global. Because the boundaries of specific ecosystems seldom coincide with political and administrative boundaries, there is significant interest in the concept of regional environmental governance. Balsigera and Debarbieux (2011) suggest that, in many areas of environmental policy,

> "… the emphasis on the global has also been a source of disappointment because some of the conferences produced poor agreements or no agreement at all and some of the global institutions or agreements generated few results. Those still willing to overcome mainly national level definitions of environmental problems and solutions diagnosed the situation as "global convention fatigue" and hence began to invest more on sources of impetus, implementation, and innovation at the regional level. Therefore, the idea of region, especially when the term refers to transboundary or supranational entities, was welcomed by many who were eager to build effective and efficient projects and institutions."

Many reflections on regional environmental governance have specifically highlighted river basins as one area in which the approach of defining regions in terms of their environmental rather than political or economic characteristics could be implemented.

> "In the global South, new regionalization could be extended to other processes of rescaling and scale empowerment, which bioregionalism is part of" (Giraut 2011).

The challenge that immediately arises and which is fundamental in the context of water management, is that the geographical limits of a region that is identified, for instance, by its environmental dimension will usually not be congruent with others that are identified by economic, political or cultural considerations or indeed with a different set of environmental dimensions.

This incongruity provides an important perspective for the understanding of the role of rivers in regional integration since, while it is the environmental dimension that attracts policy analysts to the

concept of the river basin as the appropriate scale of management for shared waters, it is the economic and social consequences that are usually of most interest to their political principals.

> "…. even though numerous examples of cross-border environmental regionalism have been under way for some time, especially in Europe, little scholarly work has addressed its implications for progress towards sustainable development in the sense of an integration of environmental, economic, and social challenges and opportunities (in other words, policy integration). This lacuna is of importance to the prospects for environmental regionalism." (Balsiger 2011)

Problem-sheds Not Watersheds

One concept that arises repeatedly in this context, is the need to work in flexible "problem-sheds" rather than in rigidly defined territories. An early reference to this concept was made in a 1990 review of water resource management in the USA, where in 1981, river basin commissions had been disbanded. This had left an apparently chaotic situation in which, as Light and Wodrask (1990) describe,

> "…. there were 18 federal agencies in 7 departments and 7 independent agencies, and 25 separate water programs with some 70 separate appropriations accounts. In Congress there are 23 committees and subcommittees. Federal rules and regulations now number around 200. There are reportedly 123 interstate compacts dealing with water appropriations, bridges, ports, and environmental protection. At the state and local level, experts have tabulated over 100,000 entities of every size and description engaged in some aspect of water management."

This was seen as a serious challenge, given the growing number of water resource-related issues that had to be dealt with. Hence, they believed that:

> " …..new ways must be envisioned for multiple governments and agencies to work collaboratively in policy areas that are "greater-than-local," "problemshed," or "systems level" in perspective and design. Once formed, such structures must support rather than frustrate or impede the water resource solutions which can protect and preserve our nation in the future." (Light and Wodraska 1990)

More recently, Allan (2005) has noted that

> "The powerful insight of the problemshed forces us to shift the analysis from a hydro-centric focus to a comprehensive approach embracing the political economy and other relationships that are part of operational water allocation and use."

The concept of "problem-sheds" came up again in the Harvard review of environmental regions, with many of the participants noting

> "… the need for flexibility and variety in regional arrangements, and the tendency of different environmental processes and problems to occur within different "problem-sheds". They nonetheless found it possible to propose a particular kind of unit as paradigmatic of the environmental region if all else is equal and to expand the use of such regions beyond that of a narrow response to a single problem. What that unit should be, however, was a matter of much further disagreement. Each of the most frequently proposed types – watersheds, ecosystems, and bioregions – had its advocates and its critics, but so did several other options." (Meyer and Foster 2000)

This approach has been found to be useful in the specific case of Southern Africa where the patterns of resource utilization do not match the boundaries of river systems (Jacobs 2010) and indeed reflects the emerging practice which has seen water management organized around demand centres rather than around the physical supply.

The "new regionalism" concept provides useful insights into the evolving ideas about environmental regionalism and governance. With its emphasis on a diversity of approaches and the applicability of variable scales for different activities as well as a recognition of the dynamism of regional processes and the relevance of informal as well as formal mechanisms, new regionalism provides a useful framework for considering both the broad challenges of regional integration as well as the more specific question of the role of water resource development and management in integration processes. Much of the debate and practice that is evident in the evolving architecture of water resource management in Southern Africa can be understood as the outcomes of interactions between the traditional regionalism of the political domain and the environmental dimensions of new regionalism.

Regional integration and regionalism at work in different environmental contexts

A set of examples from different regions of the world show how regions, regionalism and regional institutions have evolved in new forms to meet new needs and respond to new pressures. Aside from the conventional political, security and economic dimensions of regional cooperation, these include the incorporation of environmental considerations into a regional framework. This is particularly relevant to the current conjuncture in Africa.

European examples – new regionalism built on an old model

The example of regional integration most often cited is that of Europe. This is an interesting case since it combines the political and security paradigms with the more functional, economic and cultural analysis. It is also important because it is the model that has guided much of the thinking about and policy work on regional integration in Africa, not least because Europeans have been the principal funders for these activities. But, as described above, the evolution of the European Union did not follow a clear-cut sequence of stages but rather evolved from areas of limited cooperation to full-blooded integration of some (but not all) of its members. And, since not all countries in Europe are members of the EU, the role of other structures is of relevance.

Europe has also been a focus of interest for students of "new regionalism". Within the European Community, the concept emerged of a "Europe of the regions" implying that, as the role of nation-states weakened, new territorial structures would gain in importance (Keating 1997). This has, in turn, led to important discussions about whether the objective of European Union should be convergence or cohesion and whether the disparities between sub-national regions should be addressed as a European or a national issue (Tarschys 2003). However, given the challenges in Europe post the 2008 economic collapse, the policy of supporting less developed sub-national regions has been continued (European Commission 2011).

Regional environmental governance is a major issue in Europe, with a constellation of institutions at different scales playing different roles. Of particular interest is the role of the United Nations Economic Commission for Europe (UNECE), one of five such UN Commissions globally. The UNECE's stated aim is

> "… to promote pan-European economic integration. To do so, it brings together 56 countries located in the European Union, non-EU Western and Eastern Europe, South-East Europe and Commonwealth of Independent States (CIS) and North America. All these

> countries dialogue and cooperate under the aegis of UNECE on economic and sectoral issues“ (UNECE 2014).

In support of this broad aim, the terms of reference of UNECE's environmental committee (UNECE 2007) are more targeted and explicitly aim to support neighbouring countries of Eastern Europe, the Caucasus, Central Asia and the Russian Federation, as well as South-Eastern Europe which are not members of the European Union and, implicitly, to encourage them to follow the European Community's approach on environmental matters. The UNECE thus provides EU member countries with a political region, established by the United Nations, which enables them to reach parties who are not part of other regional groupings.

As an example, in the field of water resources management, the UNECE has taken the lead, with its Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE 1992). It also has conventions in force on Transboundary Air Pollution; Transboundary Environmental Impact Assessment; on the Transboundary Effects of Industrial Accidents; and on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters.

Other historical examples of regionalism in Europe illustrate both the changing topography of regions as well as the importance of political and security drivers in addition to economic and cultural ties. Katzenstein (1996) charted the progress of "Scandinavianism" between 1914 and the end of the Cold War in early 1990. During this period, intra-Scandinavian trade declined after the 1st world war; during the 2nd world war, Denmark and Norway were occupied by Germany, while Sweden remained (profitably) neutral. After that war, Finland signed a treaty of friendship, cooperation and mutual assistance with the Soviet Union while Denmark and Norway were founding members of the opposition NATO (North Atlantic Treaty Organisation) and Sweden remained neutral. A Nordic Council was established in 1952 as "an attempt to conceal with activity in the area of low politics the fundamental shattering of Scandinavianism in the area of high politics." At the end of the Cold War, Sweden and Finland joined the European Union while Norway stayed out.

Katzenstein suggests that the Scandinavian experience illustrates the general point that regional cooperation in the domains of political and security issues reflects the language of the balance of power, applied to geographically defined systems and subsystems. He cites other authors who state that "a world of regions is nothing but a return to a multipolar balance of power system" with "imbalances in power … generating rational strategies of "self binding" through which weaker states seek to escape from the domination by stronger ones."

Latin America – Mercosur and the Andean community, in pursuit of economic benefits

Latin America offers another perspective. While regional integration has long been an explicit political objective in the continent, formal progress has been limited and only 5 out of 12 South American countries are full members (a further five are associates). The Mercosur programme, whose development coincided closely with the emergence of democracy in South Africa and the transition from SADCC to SADC, was designed to link the countries of South America. It has had a chequered existence, its role and functionality varying with political developments in its member states. A recent review (Doctor 2013) has considered the objectives, performance and drivers of the Mercosur. She highlights the importance of domestic issues in framing regional approaches, specifically:-

> "… the role of (i) domestic policy convergence (especially preferences related to trade liberalisation, (de)regulation and production integration); (ii) economic elites and interest

> groups (especially distributive implications of integration); and (iii) societal identification with shared values and the creation of a sense of community (especially important in generating regional legitimacy and cognitive interdependence)."

She locates these in a global geopolitical context covering three periods, the focus on improving the region's terms of trade and promoting local development immediately after the 2nd World War (which included building continental organisations such as ECLAC, the regional equivalent of Africa's ECA); a focus on creating more 'open regionalism', in the early 1990s, after the end of the Cold War, emphasising market liberalisation for economic integration; finally, new approaches to address the failure of structural adjustment and increases in poverty.

> "… a number of market critical and 'progressive' political leaders won elections in Latin America. The focus of their regionalist policy often entailed a renewed emphasis on political and social cohesion and a shift to pro-developmentalist attitudes about economic integration." (Doctor 2013)

Less well known is the experience of the Andean Community which, it has been suggested, is important because it is explicitly an "eco-region", originally composed of countries one of whose primary linkages was that they shared the Andean mountain range which runs the length of South America. Originally founded in 1969, the community included countries on the west of South America (Bolivia, Chile, Colombia, Ecuador, and Peru) with Venezuela joining in 1973. Since then, membership has fluctuated with the political developments in the member countries and there are currently only four members since Chile and Venezuela separately withdrew, due to policy differences.

> "….. despite its identification with a mountain range, the community is usually—and strangely enough—not considered to be an environmental initiative. This also despite the fact that the Amazon Treaty — a fairly traditional environmental agreement — was launched as a reaction in the 1970s. Interpreting it as an eco-regional process is therefore an uncommon perspective on this "strange case." (Church 2010)

What the evidence suggests, however, is that common geographical features and environmental issues have played a limited role in the Andean Community. Although there is a regional agreement on Integrated Water Resource Management (Andean Community 2011), this merely sets out the principles governing national water management since there are limited shared river basins in the member countries. The objectives of the Community are similar to those of other regional institutions, namely to improve the living standards of their peoples, through integration and cooperation on economic and social matters.

The dominant interest of the Andean Community remains economic and a primary policy challenge continues to be the state of its relations with the Mercosur, the other dominant regional force in Latin America. Church suggests that "…. it can arguably provide for an "alternative model", especially given that the community is a regional organization of the South and is located in a postconflict area." He also notes that, to the extent that environmental issues have received higher priority by the Andean states, this reflects external preferences.

> "… Since the end of the 1990s, the place of the environment has risen significantly in the agenda of the Andean states. For Chile, Peru, and Colombia, there is a general agreement that the negotiation of free trade agreements (FTAs) was instrumental in this regard, due to pressure from the US Senate."

South East Asia's networked and informal regionalism and the Mekong exception

The evolution of the South East Asian region is cited as an illustration of a different form of regional integration, one characterized by informal networks and consensus rather than formal organisations and agreements.

> "Based on this analytically eclectic model of Asian regionalism one might expect to find, first, that regional approaches to environmental degradation in Southeast Asia have been similarly characterized by informal and spontaneous networks and, second, that efforts to formalize policy-making at the regional level have impeded rather than enhanced regionalism.

Yet, in the environmental domain (and by extension, in water) this is not what has occurred:

> "Since environmental issues were first inscribed on the ASEAN agenda in 1997, there has been an admittedly slow and often uneven trajectory of institutionalization of environmental governance arrangements. ASEAN environmental regionalism, rather than being constructed through private, bottom-up, and spontaneous processes, has been very much driven by ASEAN member states. Thus vertical modes of governance … have been much more prominent than the horizontal modes of governance that characterize networks." *(*Elliott 2011)

This may reflect the fact that, in many cases, environmental issues have been pushed onto the regional agenda by external forces, rather than responding to local demand. The establishment of the Mekong River Commission is a classic example of this. A Mekong Committee was established in 1957 by the United Nations Economic and Social Commission for Asia Pacific (UN-ESCAP), "with strong support from the United States". This was at the height of the Cold War and shortly after the decolonisation of what had been French Indochina (Vietnam, Laos and Cambodia) as well as British Burma (now Myanmar), at a time when there was a determined effort by Western countries to keep the region within their sphere of influence, particularly after the Communist Party had come to power in China in 1949. "It was specifically the U.S. Bureau of Reclamation being used as means to reduce the threat of communist expansion in the Cold War 1950s" suggest Suhardiman et al. (2012).

In its first phase, and with the strong encouragement of the US government, the approach of the Commission was strongly influenced by the example of the US TVA and early plans foresaw the development of a series of hydropower dams along the river. In 1965, following the earlier lead of US President Kennedy, US President Johnson advocated a Mekong River programme that would 'dwarf the Tennessee Valley Authority'.(Grey 2013).

However, the escalation of Cold War conflicts with the USA led to a generalized regional conflict and little progress was made on Mekong development. After the war, the withdrawal of the USA and the political stabilization of the countries of the region, Mekong development came back into focus, this time with the primary support of European countries. A new agreement, to establish a Mekong Commission to replace the Committee was signed in 1995 but reflected the determination of the European countries to enforce the environmental objectives that they had failed to have accepted at the 1992 Rio Summit on Sustainable Development. As a consequence of this focus, the Mekong process went through another decade of planning, this time focusing on what was considered to be sustainable resource use, through their contentious interpretation of the IWRM paradigm, which largely avoids any consideration of infrastructure development (Muller 2008).

The subsequent failure of the MRC to have an impact is explicitly blamed on this external framing of the approach to collective action, driven by a European perspective (Cogels 2014), which is clearly at odds with what Elliott (2011) described as the "ASEAN way":

> "The way international donors promote the application of IWRM worldwide can result in a critical limitation of donors' actual influence on transboundary water resources outcomes. The history of water governance in the Lower Mekong Basin provides a case in point. There the role of international donors has been preeminent as evidenced in the formation of the Mekong Committee (MC) in 1957 and its later transformation into and operation as the Mekong River Commission (MRC) in 1995. Compared to other river basin institutions worldwide, the MRC is equipped with a comprehensive organizational structure to link regional and national development. However, the MRC has been unable to translate the outcomes of its regional programs into policy formulation at the national level. (Suhardiman et al. 2012)

It would appear that, in the Mekong case, environmental regionalism has been defined over a number of decades by external preferences rather than any dominant internal logic or priority as a result of which the institutions established have had limited impact. This case has important implications for the approach to the use of water resources in support of regional integration.

Central Asia

The disintegration of the Soviet Union in 1989 provides a similarly important example, this time of the counter-factual, a situation in which pre-existing regional integration, which included cooperative water management with shared benefits, has been reversed. While, after 1989, Baltic states such as Lithuania and Estonia were able to join the European Union (and benefit from its regional policies), the Central Asian republics lost many of the advantages of membership of the wider union without the same level of compensation. Subsequent efforts to cooperate and coordinate, let alone integrate, have been relatively unsuccessful. As one author summarises the situation:-

> Central Asia's patrimonial leaders are driven by survival and personal enrichment, and are beholden to informal vested interests. Since economic regionalism involves liberalisation that adversely affects these actors, the result is 'virtual' economic regionalism at best. In the case of security regionalism, some regional organisations progress because they bolster patrimonial regimes, with negative consequences for democracy. (Collins 2009)

The Central Asian example illustrates the interplay between the political and economic dimensions of regional integration. The specific implications for water management are discussed in more detail below.

Relevance to Africa and water-focused environmental regionalism

The discussion above has particular relevance to Africa, many of whose challenges are not necessarily unique but may be more acute than those faced by other regions. Africa offers many examples of regionalism both traditional and new. Regional approaches are particularly important for Africa given its size and the large number of relatively interdependent small countries which share a range of resources, including water. A shared political history of colonialism which has divided social and ethnic groups has strengthened forces encouraging regional interaction. However, it has also created national political economies with strong countervailing motivations to sustain national divisions and restrict regional interaction and its limited human and financial resources

restrict its ability to develop and operate a complex set of national and regional institutions at different scales for different activities.

It is notable that, even in geographies with a strong tradition and well developed institutions of regionalism, environmental regionalism as a political construct (as opposed to a technical frame) is relatively weakly expressed in practice. As discussed below, the example of the institutions established under Europe's Water Framework Directive suggest that the sub-set of "water-focused environmental regionalism" is even weaker. Given the many social, cultural and political dimensions of connection and division that are involved, it is not obvious that that environmental regionalism in general nor specifically focused on water carry significant weight or priority. At the least, it can be concluded that "water regionalism" is but one of many dimensions which may be addressed through regionalized institutions and approaches. This raises questions about the focus given to this approach in the even more challenging context of Africa.

But before the practicalities of regional governance of water in Africa can be considered, it is first necessary to consider the nature and purpose of water resource management.

Approaches to water resource management

In order to understand how water and its management may impact on regional development and integration, it is necessary to consider the objectives and activities that constitute "water management" and how these have changed over time. Two sets of generic activities are involved in water management, those that intervene physically to manipulate the resource and those that regulate the way in which people interact with the resource, whether directly or through technological intervention.

But as this section shows, there are also two potentially sets of objectives that have emerged for water management. The first, is primarily to serve the interests of the users of water. The second, is protect the resource itself, not simply for utilitarian purposes, so that it can serve the objectives of other users now and in the future, but as a normative goal for society.

Competing paradigms have emerged that need to be understood before the actual or potential contribution of water and its management to regional integration can be considered. It is useful, once again, to consider these issues in an historical perspective.

Historical – pre modern

If water resource development and management is to contribute to social and economic development and thus to regional integration, this will be mediated through the institutional arrangements that support and guide the process at different levels.

As already outlined, much of the study of the so-called "hydraulic civilisations" has focused on the organization of the collective efforts required to translate the natural availability of water into a reliable and adequate supply to support economic activities and underpin increasingly complex forms of social organisation.

The initial opportunity often arose in very simple circumstances. In rivers whose flow varied seasonally, flood recession agriculture (often associated with fisheries) could be undertaken on an individual, household or small community basis; the only cooperation required was to delineate and regulate access to the productive areas. Residual examples of these practices still exist in parts of Africa although population pressures have seen conflicts emerge between pastoralists and crop farmers in Senegal, in the West, Sudan in the North and Kenya in the East (Scudder 1991; Freudenberger & Freudenberger 1993).

In societies such as the Netherlands, where the primary objective was to reclaim and protect land from the sea and rivers, the primary requirement was for cooperation between neighbours to build and maintain a basic infrastructure of relatively small dykes and channels (Borger and Ligtendag 1998); the earliest water law often regulated the contribution of individual households to such tasks and provided penalties where they failed to meet their obligations (Caponera 1992).

As water works grew in size and complexity, more resources and higher forms of social organization were needed to support the investment and regulation required. It is hypothesized by scholars such as Wittfogel (1957) that state structures emerged in Asia, in China, India, Cambodia and Sri Lanka as a result. In other regions, while governments played a role, other forces were also at work. In Egypt, for instance, water management was regulated as a quasi-religious activity with priests guiding the behavior of communities. To the extent that this required good knowledge of the physical conditions, religious activity sometimes overlapped into what today might be considered to be hydrological work – the connections between Egypt's Coptic Church and its Ethiopian counterpart provided a link to the source of the Nile and intelligence from it; the long and complex relationship is

documented in Erlikh (2002) and in Carlson (2013) and, millennia later, the churches still play a role in water management negotiations (Ahram online 2013).

In many cases, the process of state formation was supported, in large measure, by the productivity that was unleashed by the effective management of irrigation-based agriculture. Agricultural surpluses made it possible to establish large urban settlements, where specialized production and trade could be undertaken and to mobilize and supply armies. And early civilisations thrived and grew or decayed in large measure as a response to the effectiveness of controls over water use (Caponera 1992).

This was made possible, suggests Wittfogel, by the competence of governments who begins to detail the activities involved in water management. He mentions the constructional achievements, the "creation and maintenance of large waterworks for productive and protective purposes (irrigation and flood control) and, under certain conditions, the creation of navigation canals and extended aqueducts for conveying drinking water". But these technical achievements were matched by the organizational, which included "operations inherent in large-scale and planned construction (counting, record-keeping, handling of large numbers of persons), processes of using what has been constructed (management of hydraulic and non-hydraulic installations). And he notes that these organizational achievements were extended into other spheres of government activity, notably in communications (state post) and the maintenance of armies.

From administration to an Anthropocene development and management

Early interactions of people and water were generally not large enough to have a significant impact on the resource itself although they often physically transformed the local environment. While building, operating and maintaining the works needed to capture and retain water or to protect fields from flooding strained the resources of communities and required new forms of social organization, they did not use a significant proportion of the water available. Pollution may have had local impact on downstream neighbours but not on the ecosystems of the resource as a whole.

In these circumstances, nature determined water management activities. Caponera (1992) cites the Chinese Li-Chi ceremonial rules:

> "In spring, all life starts and rains of heaven fall on earth, and therefore, let the waters run and irrigate the fields …;" in the summer months, "build dams and dykes and store the waters for later consumption….;" "in the winter months, life ceases and therefore hardship arrives "…let inspection of works and collection of water rates and taxes be undertaken … punish offenders".

As populations grew and the scale of water use increased, attention was thus focused on the works required to achieve the goals of capturing and controlling the resource and transporting it to where it was required. This gave rise to the great water engineering works of China and Rome and to the complex irrigation systems of India, Cambodia and many other regions and later to the navigational and urban water supply systems of Europe.

At this point, the practice of modern water management emerged as primarily an engineering challenge. As industrial economies evolved and cities grew, they needed a water infrastructure to supply, in the first instance, and then remove the water that was used by people and their economic activities. In many cases, the scale of intervention required quickly exceeded the capacity of individually or locally driven solutions and often required the engagement of public authorities at city, state or national level. In the water domain, this period marked the beginning of the Anthropocene period, the epoch in which human activities began to have an impact on Earth's

ecosystems at global scale. Crutzen (2006), who popularized the term, identified its start as the invention of the steam engine.

This had important impact on the management of water and took it to the next stage. While engineering works were initially directed to meet the needs of their users, as their scale increased, it became apparent that the implicit assumption that they would not have an impact on the resource itself did not hold. Pollution from one industry affected the ability of others to use the waters; cities that had exhausted their local supplies found themselves in competition with others, as they expanded their sources further afield; the productivity of irrigation systems as the nature of the soils themselves was changed. It thus became increasingly obvious that the use of water would have to be regulated to protect other users of the resource and that the systematic way to do that was to manage the resource as a whole.

Hydro-centric versus hydro-supported approaches

Even in early history, two typologies of social and cultural response to the emerging challenge of developing, managing and using water can be identified. In one, water was strictly an adjunct to other activities, it supported them. Communities required water for drinking and bathing; building pyramids required water transport (Harrell and Storemyr 2009); many early cultivators relied on flood recession agriculture along major rivers, which provided substantial returns in food energy for the labour employed in production (Park 1992; Fox and Ledgerwood 1999). In these cases, and many others such as the use of water in artisanal and industrial activities, water was largely a vehicle for larger social processes, the construction of pyramids; growing of food; preparation of cloth; the accumulation of wealth and power. Where cooperation and coordination was needed, water use might be governed by laws and regulations but these were matters of administration.

But there is also another set of typologies in which water was, subjectively at least, a central feature in social cosmology. In most early societies,

> "… with the probably exception of China, the earliest water control systems have been closely associated with religious beliefs; water constituted a gift of God or possessed a divine nature and served as an element of purification or a reward for a state of grace or an instrument of punishment" (Caponera 1992) .

Beyond religion, there were other societies where a focus on the management of water was an existential matter and social institutions evolved to reflect this. Perhaps the best example is that of the Netherlands, a nation that emerged, quite literally, from the swamps (or coastal marshlands, through coordinated collective land reclamation and maintenance.

It is useful, for the purposes of understanding water management in support of regional development and integration, to characterize this distinction as one between the quasi-mystical hydro-centric and more pragmatic hydro-supported approaches. In summary:-

> **Hydro-centric** approaches give water and the water environment a special place at the centre of a society's activities and organization; while
>
> **Hydro-supportive** approaches simply consider water as one element of broader social activities, its management as one contribution to the achievement of wider social goals.

Some examples are presented to illustrate the 20th century incarnations of hydro-centricism. What emerges is a very clear picture in which a narrative is used that appeals to instinctual hydro-centricism in order to achieve more ordinary political objectives

Hydro-centricism: Netherlands, Egypt, the TVA and Turkey's GAP

While early civilisations grew on the basis of their effective use of water to support economic activity, the management and development of water resources with the explicit intention of expanding economic activity production marked a different approach, although often building on previous history. To illustrate this, the experience of Egypt's expansion of its Nile infrastructure and the Netherlands' modern programme of land reclamation and water management illustrate an historic progression while the USA's Tennessee Valley Authority development and Turkey's Great Anatolian Project, the GAP provide examples of water resources mobilized explicitly to create new opportunities.

The Dutch construction of systems of dykes, polders and drainage to reclaim and protect land from the sea required a high degree of social organization as well as significant investment. It gave rise to the establishment of local administrative organisations, the Water Boards, which in turn became the prototypes for broader local government in the Netherlands and elsewhere. In the second half of the 20th century, there was however a deliberate effort to expand the national territory and create additional economic opportunities, as well as to enhance the resilience to floods of the "Randstad", the expanding economic and urban hub of the country. The process of land reclamation and water management enabled the expansion of Dutch agriculture and industry and underpinned the country's role as a major trading power (Borger and Ligtendag 1998). Eventually, it was decided that there had been "overreach" and some planned development was scaled back; this was both for environmental reasons but also because the urbanization opportunities created were not attracting the support that had been envisaged (OECD 2013).

The experience of Egypt was similar. With an expanding population and constrained economic opportunities, the country needed to move from a reliance on its traditional relationship with the natural cycles of the Nile River, on which it depends for almost all of its water, and to use it more effective and intensive manner. This was done by building sufficient storage in the Aswan High Dam to regulate the flow of the river. This engineered reliability of supply permitted an increase of about 15% in the country's irrigated area (about a million acres). More important, it enabled multiple crops to be grown each year, substantially increasing productivity. It also reduced the risks posed by drought – to which the country was particularly vulnerable – as well as generating a significant electricity supply, which was one of the initial drivers for its construction (Farvar & Milton 1972).

The interplay between water and society has evolved over centuries, in both the Netherlands and Egypt. Today, water management responds to a more modern and explicit set of objectives, providing the basis for spatial planning and land development. But these relatively recent initiatives still shared an appeal to the mythology of water as the key to unlock development.

The TVA was an iconic hydro-centric development in which the mythology of water's central contribution to development was explicitly cultivated in order to overcome mundane political opposition to a broader development programme. Another more recent example is the Turkish Great Anatolian Project (GAP), an exercise in the strategic use of water to promote regional objectives, which is discussed in the section below on the mobilisation of water resources for regional integration.

Environmentally focused hydro-centric approaches

While earlier hydro-centric approaches focused on socio-economic objectives, new forms are today promoted, often with great fervor, to achieve environmental goals. This has occurred despite the expert views cited above – including those of environmental practitioners – which suggest that the

river basin is not necessarily appropriate as the appropriate scale for environmental management generally or water resource management specifically.

This approach, a particular form of integrated water resources management (IWRM) was, until recently, dominant and the universality of its application, in policy discussions at least, had achieved the status of a "sanctioned discourse" (Allan 2003). As an example of the power of the language, two authors recently found it necessary to make explicit reference to the linguistic constraints of their paradigm:

> "While basin boundaries make sense from a hydrological point of view, they may be inadequate for addressing particular water resources problems that are caused by events taking place outside the basin. What is desired is the highest level of performance, however defined, of the entire physical, socio-economic and administrative water resource system. To the extent that the applicable problems, stakeholders and administrative boundaries extend outside the river basin, the physically based 'river basin' focus of planning and management should be expanded to include the entire applicable 'problem-shed'. ***Hence, consider the term 'river basin' used in this book to mean problem-shed when appropriate***." (Loucks and van Beek 2005) (emphasis added).

This example of the almost ideological influence on what is nominally a technological discourse illustrates the challenges of understanding current approaches to water resource management and the residual power of the hydro-centric approach of the ancients.

The alternative hydro-supportive paradigm

The reasons for the **policy** dominance of the hydro-centric approach are not immediately obvious. There is a hydro-supportive alternative which remains, arguably, the dominant current **practice**. In these approaches, water management is simply an adjunct activity within societies which have their own pattern and rhythm of development. And because this water management paradigm is not as visible, it is important to understand its content and evolution (see Priscoli (1998) for more reflections on this theme).

For a start, hydro-supportive approaches are not supported by compelling social and economic narratives. Instead, they have been characterized as a product of old-fashioned, self-serving, engineering or administrative hegemonies (Molle et al. 2009). But while water bureaucracies have undoubtedly been associated with rent seeking activities that have, on occasion, led to unnecessary, wasteful or damaging projects, this is hardly restricted to the water sector which has been a relatively honest performer in countries traditionally associated with corruption and rent-seeking (see, for example, Wester et al. 2009).

Hydro-supportive approaches emerge when the scale of social and economic activity and associated water use begins to exceed the ability of the local resource to meet it that formal area- or resource-wide water resource management (as opposed to local exploitation) becomes necessary. This has occurred at different times in different places. A sequence of approaches to water management (Figure 2) has been proposed by Allan (2005) that relates economic development trends (in this case, the extent of irrigation, but it could equally be the intensity with which available water resources are used) to water management approaches. What it demonstrates is that countries with different objective circumstances are likely to adopt different approaches and that there will be growing contention between the perspectives in those countries.

What Allan observed was that the approaches of the "neo-liberal North which comprised only about 1 billion out of the 6.5 billion of the world's population at the turn of the millennium" were rejected

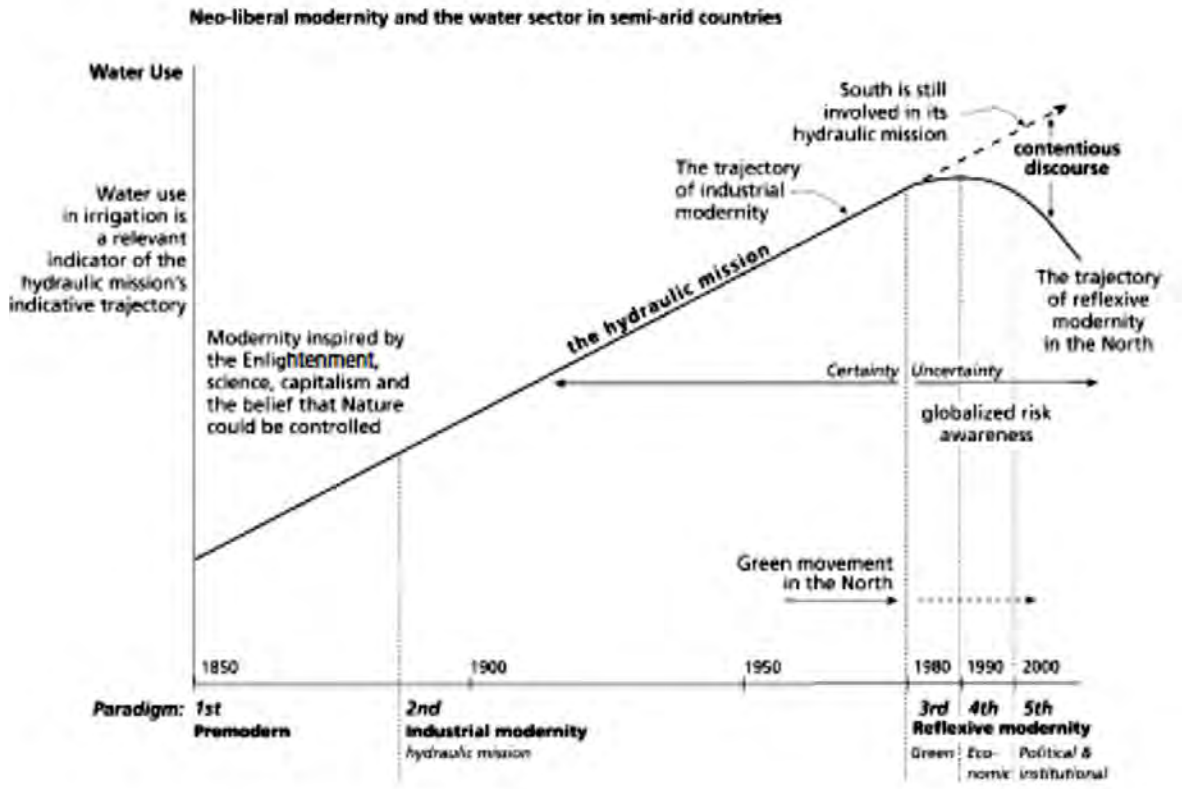
by the major economies of China, South Asia and the three Middle East countries that constituted 75 per cent of the region's population – Egypt, Iran and Turkey.

> "Governments, engineering establishments and major water users in agriculture of over half of the world's population created almost unassailable coalitions against the arguments of the international green social movement and greened international agencies such as the World Bank. Many Northern bilateral donors, emulating the World Bank, also extended their green, and later their economic efficiency, principles to their aid policies."

Moreover, he also notes that:

> "… these Southern economies also achieved spectacular increases in production, by four and five times in the major staple grains, between 1961 and the end of century. These increases resulted, first from increased freshwater use, secondly from the expansion of the rain-fed area of crop production, thirdly from increased efficiencies in the use of land and water and fourthly from the effective use of other inputs such as energy and fertilizers. Again a hydro-centric approach would lead to only a partial explanation of how these increases in crop production had been achieved."

Figure 2: The five water management paradigms (Allan 2005)



The current hydro-supportive paradigm emerged in large measure with the rapid evolution of the application of science and technology, particularly computing technology, to the complex problems presented by the management of dynamic, multi-dimensional, stochastic water resource systems (as opposed to the relatively simpler challenge of designing and building engineering works). It is easy to forget that it was only in the 20th century that the full extent of important river systems such as the

Nile were comprehensively mapped and in the second half of the century that it began to be possible to model them – the report of the Jonglei Investigation Team (1954) which studied the feasibility of reducing evaporative losses in the Nile by building a canal to bypass the Sudd swamps in the Sudan illustrates the limits of knowledge which prevailed in the 1950s. While the determination of individual hydrological elements of river systems – precipitation, runoff, infiltration, evaporation and flow – could be assessed and predictions made of their behavior, the ability to model whole hydrological systems is of relatively recent origins. One reason for this is that the computational power needed to represent and model stochastically dynamic complex systems with such a wide range of variables is also a product of the 2nd half of the 20th Century.

> "Operations analysis of water works systems have been carried out manually for many years. These are, of course, greatly limited in scope especially if multiple-purpose efforts or economic optimization are involved. Much progress has been made (Thomas and Burden 1965) in optimizing hydrological systems using computers, both digital and analogue, or in combination. Even hydrological optimization, however, requires computers larger than any now in existence. Computer techniques that provide economic optimization of large systems which take into account social restraints also are needed." (Peterson 1966)

The rapid evolution of information technology has subsequently made it possible to construct models of large systems, but not to achieve the technocratic goal of a fair and objective decision-making process. Even as the technical ability to produce dynamic models of river basins increased, new dimensions of interest were adding to the complexity. Another technical dimension was water quality, but this is closely related to an environmental dimension, the status of the aquatic ecosystem. Financial and economic valuations were relatively easily incorporated but then the issue of the treatment of externalities arose; in many cases, these varied with social preferences and the economic status of the relevant populations. So system complexity grew to a point at which it was impossible to define objectives, criteria and optimize systems and new decision-making processes were invoked (see Loucks and van Beek (2005) for a detailed description of the challenges).

Mar del Plata sets out the conventional wisdom of the 1970s

This complexity was being encountered in different ways in different situations across the world at the same time as awareness was growing about the need for a more coherent approach to environmental management. The United Nations Conference on the Human Environment in Stockholm in 1972 was a milestone event, called as a response to growing concerns about the impact of pollution and the limits to planetary abilities to cope with increasing demands on natural resources (UN 1972). Although water was not a major focus, the Stockholm meeting was followed by a series of events focusing on specific environmental issues. A decision was taken by the UN's ECOSOC in 1973 that a global Water Conference should be held after other sectoral conferences which dealt with population (1974), food (1974) and Human Settlements (1976), all of which highlighted the central contribution of effective water management for the achievement of their goals.

Many of the issues raised in these events were addressed at the global water conference convened in 1977 by the United Nations in Mar del Plata, Argentina. This was the first (and, to date, last) formal global conference of governments to focus exclusively on the subject of water resources. Its objective was to identify and recommend the actions needed for the "accelerated development and orderly administration of water resources". Attended by representatives of 116 governments and many technical organizations, the conference and adopted a comprehensive Action Plan and recommendations.

The conference report (UN 1977) immediately demonstrates that the world of the 1970s was acutely aware of the multiple linkages and interactions between water and society. The conference recommendations placed considerable focus on the need for a more coherent approach to the development, management and use of water resources, emphasising the need for a

> "shift from single-purpose to multipurpose water resources development as the degree of development of water resources and water use in river basins increases, with a view, inter alia, to optimizing the investments for planned water-use schemes. In particular, the construction of new works should be preceded by a detailed study of the agricultural, industrial, municipal and hydropower needs of the area concerned."

They also identified the need for different geographical scales and political hierarchies to be connected:-

> "This analysis would take into account the economic and social evolution of the basin and be as comprehensive as possible; it would include such elements as time horizon and territorial extent, and take into account interactions between the national economy and regional development, and linkages between different decision-making levels." (UN 1977 para 41)

The development and management of "shared rivers" (the terminology used, although contested) was addressed, although the focus was on cooperation and coordination rather than any closer ties and there was no reference to regional integration as a goal. It was recommended that

> "co-operative action should be taken to generate appropriate data on which future management can be based and to devise appropriate institutions and understandings for co-ordinated development" and that countries sharing water resources "should review existing and available techniques for managing shared water resources and co-operate in the establishment of programmes, machinery and institutions necessary for the co-ordinated development of such resources. Areas of co-operation may with agreement of the parties concerned include planning, development, regulation, management, environmental protection, use and conservation, forecasting, etc. ***such co-operation should be a basic element in an effort to overcome major constraints such as the lack of capital and trained manpower as well as the exigencies of natural resources development***." (emphasis added)

The global diversity of water challenges was recognized and the recommendations explicitly drew attention to the need to ensure that the management of water resources was effectively integrated into national development plans and their implementation:

> "Each country should formulate and keep under review a general statement of policy in relation to the use, management and conservation of water, as a framework for planning and implementing specific programmes and measures for efficient operation of schemes. National development plans and policies should specify the main objectives of water-use policy, which should in turn be translated into guidelines and strategies, subdivided, as far as possible, into programmes for the integrated management of the resource" (UN 1977a).

The Mar del Plata Action Plan can still be considered to be a thoroughly modern agenda. Its recommendations show that many of the issues that were much later identified as new priorities were already a focus for policy-makers and practitioners at global level, including the need for greater integration of water resource development and management. The question is why they were not acted on in the interim and why they later re-emerged as priorities?

The 1980s: A political economy analysis of a lost decade

The Mar del Plata water conference provided a promising foundation but, unfortunately, was building on unstable ground. Some commentators have been puzzled by the fact that

> "….in spite of the Water Decade and the rhetoric of many international organisations and documents, the common feature of international events in the 1980's was a remarkable neglect of freshwater as an increasingly scarce resource under severe and increasing environmental stress. This "water blindness" of international policy in the sense of an obvious ignorance of the urgency of the water crisis explains why key issues of a global water policy were still far from being agreed upon, explaining why the 1980's is viewed by many scholars as a lost decade for international water policy. (Scheumann and Klaphake 2001)

Reviewing the history, this pause is not particularly remarkable. The 1980s marked the end of two decades of post-colonial economic growth and the beginning of what was characterized, in both Africa and Latin America, as the "lost decade". This was the era of structural adjustment and "Washington Consensus" prescriptions. Particularly in the donor dependent countries of sub-Saharan Africa, the funds available for social sectors declined and donors increasingly set the terms for the use of what funds were available. Since an important element of the policy prescriptions (later to be described as the "Washington Consensus" (Williamson 2004) was to reduce public expenditure, budgets for activities with long time horizons related to the management of water as a natural resource were more likely to be cut than increased – some funds did continue to flow for drinking water and the decade achieved some improvements in access to safe water. But the overarching issue was that, in the 1980s, the policy agenda of a specialized United Nations conference was unlikely to be adopted. In the 1970s, newly empowered developing countries had sought to assert themselves. Specifically, they proposed the adoption of a New International Economic Order. As outlined in the report of the UN Conference on Water,

> "The aim of these conferences, which should be viewed in the context of the current endeavours within the United Nations system to achieve a new international economic order, was to arrive at agreed measures for the improvement of the living conditions of all peoples, which would inevitably necessitate the redistribution of resources both nationally and internationally, and the application of appropriate institutional and technical machinery to that end. (UN 1977a p.103)

This language was a clear challenge to the dominant powers and what happened subsequently may be seen not simply as a period of economic crisis and policy stagnation but as a period of strategic "pushback" against these growing pressures. This pushback was made possible by the fact that, in the 1970s, developing countries had been allowed and indeed encouraged to borrow extensively. As an example, according to a 1981 World Bank report, sub-Saharan African countries' debt increased more than five-fold between 1970 and 1979 while interest rates more than doubled, imposing impossible repayment requirements. Most African and Latin American countries were in no position to dictate terms and, for the next decade, were obliged to accept wide-ranging conditionality in order to sustain themselves financially. (World Bank 1981).

The subsequent developments in water policy that occurred in the 1980s and 90s were thus not simply the continuation of existing processes based on a widely agreed normative framework. As in the wider global society, there was a fundamental break with past global policy and governance processes. In water, these had included the establishment of a scientific programme in UNESCO in

1945 which was building a foundation of science and engineering. It ended with the Mar del Plata Water Conference and the decade of structural adjustment.

A political economy analysis approach is considered to be useful in evaluating practical challenges to the implementation of development programmes:-

> "Political economy analysis investigates how political and economic processes interact in a given society, and support or impede the ability to solve development problems that require collective action. It takes particular account of the interests and incentives driving the behaviour of different groups and individuals, the distribution of power and wealth between them, and how these relationships are created, sustained and transformed over time. These relationships are crucial in explaining how politics works, how wealth is created, and how developmental change happens. " (European Commission 2012)

This approach can equally be reversed and used to understand the challenges posed to developing countries and their communities by forces located in what, for convenience, can be described as their donor communities. As described in a different but related context:-

> "… theories of international institutions, in general, have too often identified a single factor (e.g. interstate strategic interaction, domestic politics within powerful states, the behaviour of supranational bureaucrats) as "the" critical determinant of international relations behaviour. While these one-dimensional theories are parsimonious, they simply do not reflect the complexities of the international political economy, in which states, private actors, and supra-national bureaucrats all play important roles in shaping patterns of global governance. … Ultimately, the essential task facing international political economy scholars today is to identify the conditions under and the extent to which each of these actors and interests affects policymaking within international organisations, rather than arguing over whether they matter at all." (Copelovitch 2010).

This approach is particularly relevant to considerations about water resource management at a macro-scale. As Allan (2005) puts it,

> "…. no single discipline has a suitable set of analytical tools to address the nexus of water resource security, water resource sustainability and the consequences of encountering water resource scarcity. The underlying observed science on first, the hydrology and secondly, the economics of the balance between water availability and water demand of a river basin or nation, are inadequate foundations on which to analyse or predict water policy. It is much safer to use concepts combining politics and ecology – political ecology, and politics and economics – political economy. Political ecology helps identify the discursive coalitions that influence policy outcomes. Political economy encourages the analyst to look beyond the narrow regional focus of the river basin or the national boundary. Political economy provides the framework that frees us from the hydro-centric watershed. Such theory allows us to identify the economically invisible and politically silent virtual water that brings a version of water security and the possibility of local sustainable water-management regimes.

The contest of paradigms in Rio and Dublin

The political economy approach proposed by Copelovitch and Allan is appropriate to an understanding of the evolution of water resource management paradigms between 1992 and the present. While "reflexive democracy" can be argued to be an appropriate approach in developed countries which have completed their "hydraulic mission" (in Allan's terms), this did not apply to the

countries crudely classified as being of the south. Yet the mainstream, northern academic discourse about water resource management, focusing on the role of the state and modes of democracy and participation, under the banner of a particular version of Integrated Water Resources Management was dominant for almost two decades beginning after a conference in Dublin to prepare for the 1992 Rio Summit on Sustainable Development.

The history of Dublin is contested, with some groups claiming overwhelming support for its conclusions; the Global Water Partnership going so far as to demand adherence to the Dublin Principles as a condition of membership (although, after it was pointed out that many governments had not agreed to Dublin, the "conditionality" was changed to require acceptance of a (non-existent) set of "Rio/Dublin principles" (GWP 2005). However, a review by an author on behalf of one of the countries most active in promoting "Dublin IWRM" (Scheumann and Klaphake 2001) acknowledged that "Dublin had only a small perceptible impact on the water chapter of Agenda 21" (The Rio Action Plan), and that there was no reference to Dublin in Agenda 21 "because (1) not all recommendations of the Conference had been incorporated into Agenda 21; (2) Dublin had not been a conference of governments; and (3) the Dublin Principles were agreed by vote and not consensus"; this last was significant because the conference participants were dominated by representatives from the north and their invitees! Cullet (2012) gives further details of the distortion of the process, emphasizing that "In view of the fact that most policy developments following 1992 have taken place outside of a UN context, as is the case with the World Water Forum, water sector reform promoters have often been keen to portray the founding document as the 'Dublin-Rio' principles. Yet, it is significant that while the Dublin meeting was part of the preparatory process of the United Nations Conference on Environment and Development (UNCED, also known as the Rio Conference), it had been conceived separately and was always meant to be a technical conference."

The Dublin approach was subsequently imposed on the South through the use of conditional funding by aid donors and promotional funding of policy and research by northern governments (Schmeier et al. 2013). However, this approach is now widely challenged, both in terms of its analytical weaknesses the complexity of its implementation and the absence of demonstrable outcomes (Suhardiman 2012, Merrey 2008, Molle 2008, Biswas 2004, Allan 2003 amongst many others). The modalities of its imposition have been described in Muller (2008) who provides as evidence of its imposed nature the fact that it has been largely ignored by economically self-sufficient developing countries such as China, Brazil, India, Turkey, South Africa and others and that its key elements were rejected at the Rio WSSD. In her introduction to a recent collection of articles on approaches to IWRM, Tortajada (2014) writes:

> "During the past two decades, most donors and international organizations have intensively promoted IWRM as a way of solving water-related problems all around the world. Hundreds of millions of dollars have been spent for its implementation. Nonetheless, IWRM practices have been very difficult to achieve anywhere in the world, especially in macro- and meso-scale water policies, programmes and projects.
>
> Given that the concept has become part of policies and also laws in numerous countries, and based on lessons learned from previous decades, an imperative arises to objectively analyze its appropriateness in the twenty-first century. It is equally relevant to identify the main implementation gaps so that the conception and implementation of IWRM-related policies has more consequent development impacts."

In one of those articles, Giordano and Shah write that

> "This paper has two goals. The first is to push the critique even further and highlight that the use of (capitalized) IWRM has, in some cases, actually taken us away from the goals of better water management. The paper does that by showing that: (1) IWRM has become an end in itself rather than a means to solve specific challenges, thereby diverting resources from practical problems and sometimes undermining alternative, functioning systems; (2) when the goal becomes the implementation of IWRM, rather than the solution of specific water problems, it can set the reform process back; (3) the IWRM brand is being used as a tool to mask other agendas, some of them antithetical to the IWRM ideal; and (4) perhaps worst of all, the focus on IWRM is shutting out alternative thinking on pragmatic solutions to water problems. The second goal is to highlight that there are alternatives to IWRM which have worked and can continue to work in future. A final message, however, is that it is perhaps time to drop discussion for or against IWRM and simply get on with pragmatic politics and solutions to water challenges."

With practical examples, they demonstrate how successful water management outcomes can be achieved by ignoring core principles of what they describe as "Capital IWRM" suggesting that:

- You can ignore the basin
- Pricing is not the only way to signal scarcity value of water
- You do not need participation

> "There are alternatives. As has long been pointed out for complex environmental problems in general and water problems specifically, implementable solutions can be found by taking a "problem shed" approach … That is, decision makers can do best by focusing on solutions to specific problems rather than on universal, water-centred approaches. This involves understanding the physical, social and especially political context of the challenge and is in fact what the three examples highlighted in this paper did. But it is something the current IWRM discourse works against with its stock, water-based approaches to all water-related issues. As Elinor Ostrom and her colleagues concluded a decade ago: (1) there is no one best system for governing water resources; and (2) many more viable options exist for resource management than envisioned in much of the policy literature. (Dietz et al. 2003). We need to put the problems first and then work to find pragmatic solutions, whether they use IWRM principles or not" Giordano and Shah (2014).

Given this contested background, it is thus useful to distinguish between the prescriptive "Dublin IWRM" and the more generic (and practical) "Mar del Plata IWR**D**&M" (Integrated Water Resources **Development** and Management" which does not seek to exclude infrastructure from consideration from its inception. In the following sections, two specific "Dublin" recommendations are considered that are particularly relevant to this Project's focus on shared rivers: The prescription of the river basin as the primary organizing scale; and the nature of stakeholder participation in water management. The purpose of this is to describe a more structured way to address the underlying issues than the application of an ideological paradigm.

Institutions for shared rivers and "problem-sheds" – scale, functions and interactions

Of specific relevance to the current project with its focus on shared rivers and regional integration and linked to the overall approach to water resource management is the question of the scale and scope of organisations involved. One element of what is usefully described as "Dublin IWRM" (to distinguish it from the generic Mar del Plata IWR**D**&M) is its focus on management at the scale of the river basin. (see, for instance, Molle 2008, Muller 2008, Giordano and Shah (2014)). The model

that is currently most actively promoted is the establishment of river basin organisations, to which many cooperation, coordination, operational and control functions may be delegated. In the case of rivers shared across political jurisdictions, the implication is that the relevant political authority may cede certain of their powers and functions to such an RBO.

In developing countries, the promotion of RBOs as an instrument of water management has been driven by largely external forces, with various motivations. Environmentally focused organisations (and governments) have led the process.

> "… RBOs are also on the agenda of policy-makers who accord them a key role in promoting cooperation over shared water resources. They are promoted by a host of international organizations and NGOs, including the Global Environment Facility (GEF), the World Water Council (WWC), the Organisation for Economic Cooperation and Development (OECD), the World Wildlife Fund (WWF), and Green Cross International (Schmeier et al. 2013).

It has been further been suggested by some commentators (for example, Mukhtarov and Gerlak 2013) that

> "An important attraction of RBOs to ENGOs is the potential participatory venue, or vehicle for bottom-up planning that RBOs may provide, especially in the form of river basin councils."

The central proposition is that the river basin is the natural geographical scale at which water resources should be managed. This is emphasized in the Dublin statement: (ICWE 1992)

> "***The most appropriate geographical entity for the planning and management of water resources is the river basin,*** including surface and groundwater. Ideally, the effective integrated planning and development of transboundary river or lake basins has similar institutional requirements to a basin entirely within one country. The essential function of existing international basin organizations is one of reconciling and harmonizing the interests of riparian countries, monitoring water quantity and quality, development of concerted action programmes, exchange of information, and ***enforcing agreements***." (emphasis added)

While it is true that the flow of water, changes in its quality and the aquatic environment more generally can best be modelled and technically managed along its trajectory and over time within the boundary provided by the hydrological basin, this is not necessarily an argument to place all management and governance functions at this level. Many decisions about water as well as different water uses and impacts occur beyond the basin scale. The broader functions of water resource management, principally the liaison with water using sectors was well as the articulation with political authorities will normally occur within areas demarcated by different political and administrative boundaries.

It is in recognition of this other perspective that, despite the advocacy for river basin organisations directed towards the countries of the south, the countries of the north often take a different approach to their own affairs, as the OECD, has stated in a report intended to:-

> "… identify existing governance instruments for building capacity and co-ordinating water policies at horizontal and vertical levels. OECD experience shows that there is no panacea for integrating water policy, but that a wide variety of options exist:

> ● All OECD countries surveyed have set up co-ordination tools at the central government level. These mainly consist of line ministries, interministerial bodies or mechanisms, or specific co-ordinating bodies. Most countries have also made efforts to co-ordinate water with other policy areas, including spatial planning, regional development, agriculture and energy (OECD 2011a).
>
> ● Where they exist, river basin organisations, performance measurements, water information systems and databases, financial transfers, intermunicipal collaboration, citizen participation and experimentation of water policies are important tools for co-ordinating water policy at the territorial level and between levels of government" (OECD 2011).

Thus, in Britain, local government water supply operations were incorporated with river management functions into nine basin-based Water Authorities in 1972. However, when water supply and sanitation services were privatized in 1989, river management reverted to control by a National Rivers Authority (Alaerts 2003 presents the sequence in detail). This arrangement is designed to comply with the European Water Framework requirements for basin management through internal administrative arrangements.

One reason that the Water Framework Directive (WFD) did not mandate the establishment of river basin institutions was the political opposition from countries such as Germany and Spain. In Germany, water resource management is managed by the *Lander* (states) within the framework of river basin district coordination – efforts to enforce the establishment of transboundary river-basin organisations in Europe were rejected, in part because countries were unwilling to remove these functions from sub-national authorities such as the *Lander* for both practical and political reasons. As Thiel (2013) explains:

> "….a necessary condition for re-scaling is a sufficient, political, temporally defined window of opportunity in which an actor constellation that holds sufficient power resources (i.e. credibility, means to achieve its stance at low cost, coinciding with a broadly legitimized ideology) is able to bring its position to bear on formal decisions. Such a window of opportunity concerning fully fledged re-scaling of water management competencies was not given in the case of Germany, and ultimately it was also not given in Spain. In Germany, early recognition of this obstacle led to informal re-scaling to accommodate changes in ideology, European requirements concerning water governance.

In the end, river basin management objectives became to a large extent subsidiary to the overall objectives of the German states rather than vice versa:

> "When elaborating and operationalising the objectives, we must accord special importance to coordination within the river basin district as a whole. First of all, the overriding objectives for the entire river basin district must be agreed between the States/Länder … No objectives may be pursued in these sub-basin areas which might call into question the overriding objectives for the whole river basin district or even make their achievement impossible. Otherwise, separate objectives for sub-basin areas may be pursued." (LAWA 2003)

The overall preference of European countries has thus become clear and is demonstrated in practice. The European Commission reported in 2012 that:

> "…. in the vast majority of cases there has been no adaptation of existing structures to support the implementation of the Directive." One consequence of this is that, in most European Union countries, operational water resource management functions, such as

> monitoring and permitting, are still carried out by national agencies rather than regional or river organisations" (European Commission 2012).

This follows the trend in the USA where six inter-state River Basin Commissions were closed in 1981, their assets and functions transferred to individual States where, "…if the member States so elect, to carry out an orderly transition of appropriate commission activities to the member States." (USA 1981). The other three Atlantic States Commissions (Potomac, Delaware and Susquehanna) which have wide-ranging resource management powers but have focused increasingly on water quality and environmental issues, were created on the basis of formal agreements between the States concerned (see for instance DRBC 1961 and USACE 2014) while the Mississippi Commission, established by the Federal Government in 1878 and managed by the US Army Corps of Engineers, focuses on a tightly defined flood control and navigation mandate (USACE 2009). Indeed, Federal States such as the USA and Germany face particular problems with respect to water resource management which may also create opportunities for new institutional forms (see Garrick et al. (2014) for a review of the challenges posed by this structure of government, which often mirror closely the challenges faced on rivers shared between sovereign countries).

SO, while it is true that the basin is a useful physical frame within which to monitor and manage some functions, many others are best managed at other scales, particularly those that affect the wider society and its economy. Thus water from one river basin is often used beyond that basin (as in water supply to large urban areas); the benefits of other uses, such as hydropower generation, frequently flow even further beyond the boundaries of a river basin as well as between countries while environmental standards and priorities are usually established at a national level. Since the governance and management of other sectors that impact on water resources or are impacted by them is often organized at different scales, usually within political jurisdictions, there is a strong case – which seems to have dominated in developed countries – to reflect this in water resource management arrangements, to focus on the problemshed rather than the watershed.

To the extent that water resource management involves bringing together interested parties and coordinating their actions (which is the core guidance of the original concept of "integrated water resources management), it may thus be appropriate for the boundaries of water management institutions to follow those of the relevant political jurisdictions, for certain functions at least.

One argument against this is based on the work of Professor Elinor Ostrom who won a Nobel Prize for her work on the management of shared, "common pool" resources. She demonstrated empirically that, in many cases, communities were able to "self-organize" to achieve sustainable and equitable utilization of a resource such as common grazing, forest land or a shared stream or lake. However, the cases she used were almost entirely at a small scale and she and her colleagues were careful to emphasise that this type of collective management was no panacea (Dietz et al. 2003). Indeed, one of the requirements for local management to work was that an over-arching, formal or informal, regulatory framework needed to be put in place.

A more pragmatic review concludes that RBOs are an option for water management but, even if used, their form and function will vary from place to place according to the specific circumstances, including political considerations. RBOs:

> "… would in most cases complement other, already existing agencies that are considered valuable and essential (subsidiarity principle). This does not imply that existing arrangements are to be left untouched when a river basin institution is set up. … the introduction of basin-based management is typically part of a re-structuring of tasks and responsibilities across

the sector. The more invasive the functions of the basin organization are, and the more authority it commands, the more significant the required reform and the resistance against this change. Other agencies may have prevailing arguments to remain active in the sector and assume particular functions. Many basin agencies of the "Secretariat" type, such as for the Rhine Commission, assume only the coordination, whilst the infrastructure development and operation remain in the hands of local government departments of public works or water management" (Alaerts 2003).

Water as a vehicle for new forms of participative democracy, and society

The review of regional environmental governance literature has highlighted the opportunity offered by water resource management to achieve broader objectives. This is reflected by the approach taken in the "Dublin Principles". The 2nd principle was that "Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels" (ICWE 1992). This apparently specific statement conceals considerable complexity and contested ideologies as well as philosophical perspectives on the nature of democracy.

Examining the Mar del Plata report's recommendations, a naïve reader could be forgiven for concluding that the idea of "participation" was not controversial:

> "Countries should:
>
> - Promote various available measures and techniques in public participation and pay particular attention to ways of adapting appropriate m techniques to the particular circumstances of countries.
> - Promote interest in water management among users of water; users should be given adequate representation and participation in management; …. decisions should be made in the light of the expressed views of those likely to be affected by the decision
> - Make necessary efforts to adopt measures for obtaining effective participation in the planning and decision-making process involving users and public authorities. Such participation can constructively influence the choice between alternative plans and policies. If necessary, legislation should provide for such participation as an integral part of the planning, programming, implementation and evaluation process.
>
> "To this end, it is recommended that
>
> - countries should develop adequate legislative provisions, educational programmes and participatory activities that will increase public awareness and encourage public participation, as well as emphasize the value of water and the danger of its relative scarcity or abuse;
> - Countries employing such measures and techniques should document and share their experience;
> - Every effort should be made to convince the public that participation is an integral component in the decision-making process, and there should be a continuous two-way flow of information" (UN 1977).

However, a characteristic of the Mar del Plata recommendations was that they were envisaged as being primarily state-led. While this was the norm at the time, it is one that is increasingly challenged as inappropriate for a post-modern society. As Fung and Wright (2003) explain:

> "As the tasks of the state have become more complex and the size of polities larger and more heterogeneous, the institutional forms of liberal democracy developed in the nineteenth century – representative democracy plus techno-bureaucratic administration –

> seem increasingly ill suited to the novel problems we face in the twenty-first century. "Democracy" as a way of organizing the state has come to be narrowly identified with territorially based competitive elections of political leadership for legislative and executive offices. Yet, increasingly, this mechanism of political representation seems ineffective in accomplishing the central ideals of democratic politics: facilitating active political involvement of the citizenry, forging political consensus through dialogue, devising and implementing public policies that ground a productive economy and healthy society, and, in more radical egalitarian versions of the democratic ideal, assuring that all citizens benefit from the nation's wealth."

The resultant contest between what can still be seen as traditional "right wing" prescriptions for a sharply reduced role for the state and "left wing" proposals for a more active state, with an expanded area of public activity strongly echo the ideological contests of the past century and a half. There is, however, wide recognition that current democratic institutions are not performing as they should.

> "If so, then a fundamental challenge for the Left is to develop transformative democratic strategies that can advance our traditional values – egalitarian social justice, individual liberty combined with popular control over collective decisions, community and solidarity, and the flourishing of individuals in ways which enable them to realize their potentials."

Similar concerns underlie much of the critique from environmental interests about the failures of current democratic institutions to place their societies onto a sustainable path. So another set of authors (Bäckstrand et al. 2010) consider

> "…that new modes of environmental governance also harbor a normative agenda to open up politics and make environmental decision-making more inclusive, transparent, accountable and reflexive, while at the same time effective and performance-oriented. Linked to deliberative ideals of democracy articulated by democracy, governance and policy scholars, the deliberative turn thus denotes the range of more or less explicit attempts to democratize environmental politics and simultaneously foster more effective environmental policies."

Against this background, the participation debate in water management suddenly becomes considerably more complicated and it is the "progressives" who seek to reduce the role of the state. While it is not the purpose of this review to go into detail about these schools of thought, it is relevant to provide a few insights as to how they affect water policy and management approaches.

One point of departure is to note that some important democratic innovations have an origin in the practice of water management. One classical form of participatory democracy that has emerged from the water sector is the Dutch so-called "polder model", characterized by the need to achieve consensus before taking a decision. The "polder model", derived from the structure of local self-organisation of drainage and flood protection works remains an example of participative democracy (although sometimes seen as flawed and corporatist, representing interest groups rather than the population more generally).

> "New forms of "interactive" policymaking, which have become particularly popular in the 1990s, basically confirm the consensual character of Dutch democracy (Hendriks & Toonen 2001; Hendriks & Tops 2002). Cooperation is all the more a dominant feature of top-level relations among employers, employees, and the state — the socio-economic "polder model" — but also between the state, (agri)-business, and environmental organizations — the newly dubbed "green polder model" (Hendriks and Michels 2011).

While the polder model was evidently successful for small communities facing large and self-evident challenges, it has become increasingly difficult to operate. Indeed, in the Netherlands where it

originated, delays in taking strategic decisions on pressing issues (sometimes for decades), are seen by some to be undermining the effectiveness of public management. So a recent review by the OECD noted that there were

> "….. concerns about the appropriateness of the "Polder Model" in leading to effective decisions in sensitive fields such as water quality, compliance with (flood and other) standards, as well as land use. Indeed, this culture of voluntary agreements and consensus building, which is very much in line with the call for water policies to go beyond "command and control", can, in some cases, slow down and paralyse decision making because of lengthy processes, and requires relentless practical co-operation to override conflicting interests, overcome differences and take action when all have been heard. In addition, the risk of "capture" can also be a challenge, due to the very vocal nature of some interest groups while other, equally legitimate, are unheard." (OECD 2014 and see also Hendriks 2004)

As already discussed, other strands of participatory democracy derive from the work of Elinor Ostrom in water management, which were in turn informed by her engagements with Dutch researchers. Ostrom demonstrated that small communities were able to self-organise to manage common pool resources (such as water resources and forests) successfully, in a sustainable manner. But much of advocacy based on her work ignores both its scale – it was not conducted at the level of large and complex societies – as well as her own cautions. Specifically, she warned against attempts to develop simple 'panaceas' to address the challenges of managing complex systems such as water resources and offered the following conclusions:

> (a) Water resource management is complex, and that complexity must be recognised.
>
> (b) Water, as a common pool resource is best managed in terms of 'common property regimes' by users who have a direct interest in sustaining the resource.
>
> (c) Because the natural boundaries of water resources do not coincide with political boundaries, water has to be dealt with by multiple organisations through systems of 'polycentric governance' that enables interaction to occur between different institutions.
>
> (d) Effective organisations are built by users with common long term interests who can invest in monitoring and building trust, often at a relatively small and local level.
>
> (e) Central organisations such as national governments should support and guide efforts by local water users and stakeholders to create effective management mechanisms for their local resources (Ostrom 2009 and see Muller 2012 for an exposition of the relevance of Ostrom's work to the practical organization of water resource management).

In general, experience with different innovative models of democracy and governance highlight the need for caution, particularly with respect to the management of a resource as fundamentally important to society as water, where mistakes can do significant long-term damage. Rather like the normative hydro-centric approaches of "Dublin IWRM", what little evaluation of progress has been undertaken has been able to demonstrate few positive results. Ansell and Gash (2008) have reviewed over a hundred examples of attempts to translate the related approach of collaborative governance policy into practice, many with very limited success. In the spirit of the "new democracy", they used a rigorous definition of collaborative governance to mean, not a general consultative approach but:

> "A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets."

They concluded that three issues were salient for successful outcomes: time, trust and interdependence. The time required for full participation is critical:

> "Many of the case studies note that collaborative governance is a time-consuming process …. Therefore, collaborative governance is probably not a good strategy for situations in which agencies must make or implement decisions quickly."

Further, they noted that trust and interdependence can also not be taken for granted:

> "… our analysis suggests that agencies ought to consider the interactive effects of trust and interdependence on potential collaboration. We found, for instance, that high conflict situations characterized by low trust could still be managed collaboratively if the stakeholders were highly interdependent. Interdependence fosters a desire to participate and a commitment to meaningful collaboration, and it is possible to build trust in situations of high interdependence. By contrast, where interdependence is weaker, it will be difficult to effectively build trust. Stakeholders will engage in collaboration with one eye on alternative (noncollaborative) strategies. If one stakeholder is threatening to defect from collaboration, the commitment of all stakeholders is likely to suffer, and it will be difficult to develop a sense of ownership, understanding, or trust."

This conclusion serves to explain why Ostrom's findings, in small communities of resource users who know and interact with each other on a regular basis, cannot easily be transferred into much larger contexts, across regions where there may be no contact whatever between communities of people or interests.

Similar concerns were raised, from a different perspective, in reponses to the 2000 World Commission on Dams report (WCD 2000), which took recommendations about the involvement of local stakeholders in decisions about future dams to what many considered to be an illogical conclusion. Governments, professional associations and industry all raised concerns about

> …. a trend in WCD recommendations to move decision *power* from national government to local communities, promoting a "bottom-top" planning, shifting the balance of power in dam decision making "from developers and governments to the potentially affected local population". The interpretation of a "de facto veto right" for a small minority is brought forward as well" (UNEP 2003).

And it is notable that some of the WCD Commissioners were explicit about their objectives to remove governments from policy making. (McCully 2003) This was taken by some commentators as the key strategic outcome of the process:

> "One way to read the World Commission on Dams is as an experiment in decentering the authority of the state in world politics" (Conca 2002).

Beyond the question of participation lies an even more fundamental, if not romantic goal, the "resocialisation" of water. In this discourse, man (this is not a gender neutral area) has intervened through technology to control the natural resource and use it to exert power. The sustainable future lies in returning to an era in which people and water coexisted in harmony, because decisions were taken locally, by people who lived with and understood water. Much of this discourse refers to the anthropology of traditional societies, notably the original inhabitants of the Americas, which did indeed have a very good understanding of the resource and how to live with it. However, in a world approaching 9 billion people, the nature of the relationship has to change; it is interesting that a recent paper on the subject " (Linton 2014) identifies "the right to water" as a fundamental recalibration of peoples' relationship with water. As often in such theoretical if not ideological

treatises, the point is missed that one of the first engagements of technology with water was precisely to control it in order to make the services it enables more easily available to humans. When they end with a plea to "put people and politics at the center of water management" one wonders how they think water has been managed for all these years, except as a reflection of the interactions of the day between people and their politics.

Yet, to some extent, this approach is mainstream. The approach of the European Water Framework Directive (European Commission 2000) sets out, in its preamble the aspirational objective:

> "Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such".

However, in a world whose population and economies are growing rapidly, in which billions of people do not have access to adequate food, water and shelter, it is perhaps appropriate to extend Allan's diagram of the evolution of water management approaches with economic development and apply it to notions of democracy. It is not yet obvious that the desire for and priority given to the introduction of new forms of democracy in the richer countries of the world is yet relevant to the majority of those in the poorer countries who still look to a fundamental transformation of the aquatic environment to help them to meet their needs, in "real time". Given the systemic importance of effective management of water resources for societies, this is not a dimension that can safely be experimented with.

The emerging paradigm: back to basic hydro-supportive IWRM

As the previous sections illustrate, a great deal of hope and aspiration has been placed on the potentially transformative role that new approaches to water management can play in wider debates, whether about democracy, environmental governance or indeed regional integration. Without prejudice to those aspirations, many voices from the community of water resource management researchers and practitioners are suggesting that a new paradigm is emerging to focus on the very real day-to-day challenges that society faces in managing its water.

This sentiment is backed by the knowledge that, where there is a threat of water management failures that result in supply interruptions for domestic or economic use (affecting lives and livelihoods), in exposure to disasters whether of flood, drought or pollution, the priority of the communities and societies affected will be to take effective action to avert or minimize such threats. As Giordano and Shah (2014) conclude:

> "We face daunting water management challenges as demand hits the limits of supply, intersectoral competition increases, water quality declines and aquatic ecosystems come under threat. The concept of integrated water resources management provides ideas to help us consider how we can best make social choices about water allocation and access as well as the sustainability of water resources and the infrastructure we use to manage those resources. But by now we all know how complex water resources management is and that ideally it should be managed holistically, considering efficiency, equity and the environment. But we should also know by now that holistic management is costly and politically difficult, or impossible. Unfortunately, then, integrated water resources management has become (in capitals) Integrated Water Resources Management and associated with specific apolitical, nongeographic approaches. And IWRM has become an end in itself, very often supported by international financial backing. As a result, attention has been diverted from tangible water problems and priorities; well-meaning reform agendas have been set back; and the concept has been hijacked for purposes contrary to those intended by its proponents. As

troublesome, IWRM's rise to discourse domination has shut out alternative thinking on water challenges.

There are alternatives. As has long been pointed out for complex environmental problems in general and water problems specifically, implementable solutions can be found by taking a "problem shed" approach (Allan 1998; Kneese 1968; Mollinga, Meinzen-Dick, & Merrey 2007). That is, decision makers can do best by focusing on solutions to specific problems rather than on universal, water-centred approaches."

That conclusion was similar to that reached after a review of twelve diverse water management cases at different scales in different locations:

"One of the features of almost all the cases presented is that they were not considered to be explicit applications of the integrated water resources management approach. Most of them indeed began before the concept was formalized (as in India and Chile, Japan, Mexico and China) while in others it may have been mentioned in passing (as in South Africa and Australia) but the actions described were not initiated as formal attempts to introduce IWRM and were not explicitly guided by the concept. Yet, in all the cases described, in responding to the very different challenges faced at the different scales, a very similar basic approach was applied, which recognized:

- the unitary nature of the water resource;
- the physical interventions that could be adopted to manage it;
- the limits to those physical interventions; and
- the need for an institutional framework that:
    - brought stakeholders together in an equitable manner that gave voice to the weak as well as to the powerful,
    - sought to achieve a balance of interests between them and, within this,
    - recognized the value and importance of the waters concerned,
    - identified the environmental dimension of water management either explicitly as a separate 'use' or as a desirable outcome; and
    - developed organizations able to promote the overall approach.

"It is important to note this because IWRM has been attacked as an unrealistic approach. The authors would agree that, if IWRM is seen as a fixed prescription, requiring the deployment of all the tools that are available in its armoury, it is not particularly helpful, if only because of the confusion that would ensue. Likewise, where there has been a focus on individual tools, success has also been limited. The textbook tradable water rights introduced in Pinochet's Chile may have achieved greater efficiency and productivity through reallocation between economic sectors, but it failed to address key social and environmental concerns and had to be substantially revised. Similarly, the establishment of river basin organizations, often taken as a doctrinaire first step, has played only a subsidiary role in improving water management in many countries (e.g. South Africa and Chile) and no role at all in others (Denmark and Japan). Applying context-appropriate instruments in an appropriate sequence is certainly more important than any particular instrument in itself. The point is that IWRM is not a prescription. Rather, it is an approach that offers a framework within which the problems of different communities and nations can be addressed." (Lenton and Muller 2009)

Beyond IWRM – the 'Nexus' and other practical responses

As the limited value of using a contested, poorly defined and process focused version of IWRM as a guiding paradigm becomes more generally recognized, the question is how best to describe and promote approaches to water resource development and management that achieve the outcomes sought. Since the societal and natural resource contexts vary so greatly, those outcomes can be variously described as "sustainable development" or more "water security" but any attempt to become more specific is unlikely to be of general application. This is why another emerging approach, which seeks to focus on the "nexus" between water and the interaction with energy and food production, can helpfully address challenges in specific "problem-sheds" but is not helpful as a paradigm of general application (Muller 2015).

Institutions on shared rivers – scale and functions

For instance, to determine optimal institutional arrangements, one approach is to consider specific functions that need to be performed and how and where they can best be performed under specific circumstances. To illustrate this approach, the following generic functions are considered:-

- monitoring water resources and managing water resource information;
- the allocation of water between different users; and
- the planning of water resource development.

A brief review of each of these illustrates the choices and constraints that are placed on the design of institutions in different circumstances, specifically the role of local national and extra-territorial organisations.

Monitoring water resources and managing water resource information

A critical function to support any water resource management activities is the monitoring of data about a range of dimensions the water resource and its use. Since such data is only of value if collected and stored systematically over time, a permanent institutional arrangement is required. Such an institution must have physical access to the resource (to take measurements) and some relationship with or authority over users (to obtain water use information). This may be possible at a local level although the limited volume of work, the specialist skills needed and the benefits of organizational scale will usually see this centralized, often at a provincial/state or national level. The requirements of access and authority limit the usefulness of extra-territorial institutions in this role.

However, there may be benefits for water resource data to be collated, managed and analysed at a central (or even regional) level in a shared river context. For those elements of analysis that require an understanding of a whole watercourse, this collation would have to be undertaken in any case and the involvement of a common institution may help to facilitate the standardization of data between collection agencies and facilitate the interaction between national agencies.

Allocation of water between different users

The allocation of water between users is essentially the administrative implementation of a political decision made subject to the socio-economic policy of the relevant entity. It is not a "neutral" action. While the physical resource will place some constraints on what is possible to allocate, an extra-territorial institution would have no mandate to make or implement political decisions, save in very deeply integrated regions where such sovereign authority may be delegated. There are few if any examples of such an approach. However, constraints (whether on water quantity or quality) that are formulated and agreed at a regional context will provide the envelope within which political decisions are taken at national level. The development of an understanding of the constraints and the facilitation of an agreement about them may be an appropriate role for either an extra-territorial

(basin) organization or an institutional arrangement between the states concerned, particularly if they share more than one river.

Planning of water resource development

In assessing resource availability and quality, it is appropriate to consider each resource at the basin (or in large systems on a sub-basin) level. However, the planning of approaches to meet the needs of water users derives from social and economic activities; these are invariably organized at local, provincial or national level. It is the combination of these two dimensions that will determine the optimal institutional location at which the activity can be centred. In this context, the factor that will determine the institutional location of the activity will be the purpose and drivers of the planning exercise which will usually be to meet the needs of existing and future water users.

The location of the planning function should be such that it can convene the core set of water users (broadly defined) as well as to access the resource data required. In many cases, for detailed planning of resource development that does not involve direct cross-border cooperation (the large majority of cases even on shared rivers) the logical location would be national or sub-national. If the objective is to address macro allocation (between countries) or system wide challenges (such as the achievement of joint quality objectives or reviewing system operating rules) there will be some advantage in undertaking this at a shared river level; in this case, national agencies will normally convene user perspectives and a river basin organization may be able to support with the provision of resource information.

Conclusion

This limited analysis suggest that most functions can be located at a variety of institutional levels and geographical scopes but that some are more likely to be effective than others. This kind of analysis should inform the role and functions of water management institutions at different levels and, of particular relevance to the current research, those in shared rivers.

However the functions are structured, a critical requirement will be to ensure that there is provision for appropriate policy direction. Thus, in the allocation of water, an important distinction has been drawn between the physical sharing of water and the sharing of benefits from the use of that water (Sadoff and Grey 2005). Decisions about the division of benefits between users, whether at the level of individuals or countries will require negotiations guided from a socio-economic and political perspective. Similarly, water resource development planning will necessarily involve other sectors and will need to be informed by broader planning considerations.

The general conclusion is thus that, in any shared river situation, there will be a variety of institutions undertaking different functions; those with more focus towards users will be organized along administrative or political boundaries; those dealing primarily with the resource will have the ability to reflect the geographical location of the resource. What is most important is that the architecture should be clearly described, that it should be able to perform the various functions that are demanded of it and that it should be coordinate effectively with other institutions performing related functions.

Water and regional integration

Introduction

Given the above considerations, where and how has water resource development, management and use contributed to regional development and integration? This section reviews some of the cases that have been identified to illustrate a range of situations, one in which there has been a positive if controversial contribution, another which was a clear failure and a final example of a partial and contested contribution that remains a work in progress.

Turkey, Kurdistan and the GAP

A current example of a cross-border regionalism, in this case based on ethnicity, comes from the near-East where Kurdish populations comprise the majority in some parts of Iran, Iraq, Turkey and Syria. While attention is currently focused on their nation building attempts as they exploit current conflicts in the region, it is sometimes forgotten that Turkey's strategic response to independence demands was to promote a massive hydraulic development, the GAP (Great Anatolian Project), which has been seen by many commentators as an attempt to undermine and resist Kurdish nationalism by promoting economic development in the Kurdish area of Turkey. The GAP involves the construction of 13 irrigation schemes, 22 dams and 19 hydroelectric power plants on both the Tigris and the Euphrates and will eventually provide up to 25 percent of the country's electricity. (Tsakalidou 2013)

The GAP is perhaps one of the most aggressive efforts to use water to promote a particular kind of regional integration (in this case, integrating a sub-national region into the nation, with implications for various other trans-state regions). It is widely understood to be an effort to consolidate the south eastern Anatolian region into Turkey, specifically to counter Kurdish regionalism which sought to establish an autonomous Kurdistan to unite an ethnic group that is spread across south eastern Turkey, northern Iraq, western Iran and north east Syria.

> "…. the Southeastern Anatolia rural region has been neglected since 1923; thus, the increased poverty level provided a suitable environment for recruitment by the secessionist movement Worker's Party of Kurdistan (PKK), which has been engaged in armed clashes with Turkish troops in the region since 1984. Additionally, this region has demonstrated a demographic explosion, coupled with massive out-migration to the western cities of Turkey, as well as in-migration. These factors have exerted infrastructural pressure on both fronts. As of the 1990s, Turkey has attempted to solve her internal problems in terms of economic growth to alleviate poverty in the region through the implementation of the GAP project. Therefore, the GAP serves the purpose of creating economic growth and integrating the region, in an attempt to reverse the aforementioned problems by using a massive irrigation-hydroelectric infrastructure, which will utilize the land and the water of the region." (Varsamidis 2010).

Many questions are posed by this venture about the choice of objectives and the scale at which they are framed and implemented. As Harris (2002) pointed out:

> "For the specific example of GAP, the imperative is to consider not only water and conflict processes at state scales, but how processes and actors at intrastate or local scales may be important. The concern evolves from a simple one of ``will GAP result in conflict?'' to ``in what ways is GAP water development related to historical, on-going, or future modes and sites of conflict, and what is the importance of these relationships for social, political, and

> economic processes at different temporal and spatial scales?'' One of the first-order observations of engaging such an approach is to consider the ways that government sources and researchers often emphasize the state scale – for example, noting ways that GAP development will benefit Turkey in an aggregate sense, often ignoring distribution of costs and benefits of development at local or intraregional scales." (Harris 2002)

In the case of the Kurds, there are three overlapping scales, the national states, the area occupied by a specific ethnic group and the river basins. The impacts of programmes of action, including water resource development, have to be considered in all these boundaries. In the case of the GAP, it is clear that water resource development has contributed to the regional development of areas of south-east Turkey. As Warner et al. (2014) point out

> "The scale of costs and benefits of the current 'integrated' GAP project is experienced rather differently between the Turkish state, downstream Syria and Iraq, the Kurdish population, and (I)NGOs. ….. Proponents of the basin level as the 'right' scale, in sum, ignore that it comes with its own power relations and politics."

The Tigris Euphrates system provides a classic example of the overlapping of different regions at different scales and the vain attempts to define the river basin as dominant:

> In the transboundary Euphrates and Tigris basin, benefit sharing is presented by outside actors as a way forward … for example in a rather nonpolitical approach take a 'one basin' approach to explore benefit sharing. Benefit sharing also seems an attempt to reappropriate the basin level as the most natural, rational, and integrated-holistic level for resources management. An eco-centric wave idealizing the basin scale as the logical water management scale has reemphasized the ecosystem as a 'natural' level. (Warner et al. 2014)

They cite Jongerden's claims that

> '(e)cologically, this region of Turkey-Syria-Iraq comprises a unified area, the Tigris-Euphrates river system, which defines the Tigris-Euphrates (alluvial salt marsh) ecoregion of West Asia' while from an eco-centric perspective, Varsamidis (2009) maintains that the Turkish dam project turns regional water abundance into regional water scarcity (Jongerden 2009).

The outcomes so far of the GAP are still contested. At a personal level:

> Millions of Kurds have moved to the Turkish west, sometimes inflated as evidence of assimilation. … Kurdish students in Adana readily admitted their lives were better than before but also noted their parents grieved over the loss of their home towns.

The evidence also suggests that the benefits have not been equitably shared inside Turkey:-

> In Turkey, the DSI and agricultural ministry and other state actors have not managed to break the local, semi-feudal patronage power of landowners. In both countries, in sum, the river basin scale is largely nonfunctional. The river basin meets with counter-frames from NGOs, rebels, and water users. The cases illustrate that the real negotiation processes and power struggles do not take place at river basin scale, but in different arenas at different scales, aptly described by the concept of *polycentricity*, a concept now widely applied for basins like the Rhine and Mekong.

Finally, at an inter-state level, outcomes are mixed although the disturbed situation in Syria and Iraq has made the specific impact of the GAP difficult to ascertain:-

> "Turkey has consistently claimed the Euphrates and Tigris are 'national rivers' and its decisions are 'basin scale'. Opponents have reinforced the view that Turkey makes all the decisions and can control all the water. This ignores … the downstream decisions made by Syria and Iraq, which have their own infrastructure. This has made it convenient to blame any failed downstream harvest or other adverse effects on Turkey." (Warner et al. 2014)

Central Asia

If the GAP provides an example of the use of water to achieve positive, if flawed, regional development and integration, water management in Central Asian countries that were republics within the former USSR (Union of Soviet Socialist Republics), also known as the Soviet Union, demonstrates the impact of the demise of a scheme of regional integration on water management and welfare.

While they were part of the Soviet Union, water uses in the now independent republics were coordinated so that water could be used in some states for irrigation in summer and in others, to generate hydropower in the winter. The majority of dams and hydroelectric energy generation facilities were located in the upstream states (Kyrgyzstan and Tajikistan) on which the downstream states (Uzbekistan and Turkmenistan) depended for irrigation during drier periods). The system was already under stress and had become a symbol of environmentally unsustainable water management, illustrated by the dramatic drying up of the Aral Sea. But with the collapse of the Soviet Union which had provided a framework of regional integration, not even the existing cooperation could be enforced and, after the newly independent countries failed to reach a new agreement, the previous arrangements broke down.

> "Under the Soviet system, water management was highly centralized. However, with independence, water issues—like many others—rapidly became a national rather than a regional concern. Issues like land leasing and water rights had to be settled on a bilateral basis rather than by Moscow, and control over territory meant direct control over resources that could produce hard currency or improve a state's strategic position. The high stakes involved in clarifying territorial rights quickly became evident: intraregional flows of subsidized energy stopped and some transportation links were severed. "
> (Allouche 2007)

In 1992 an agreement about the management of shared rivers was signed and a range of new institutional arrangements were put in place both to promote cooperative management but also to address what was widely perceived to be an environmental disaster with the drying of the Aral Sea. An Interstate Commission for Water Coordination (ICWC) was established and subsequently, there was a follow-up agreement, follow-up agreement, on Joint Activities for Addressing the Crisis of the Aral Sea and the Zone around the Sea, Improving the Environment and Ensuring the Social and Economic Development of the Aral Sea Region. This 1993 agreement created the Interstate Council for the Aral Sea (ICAS) with an executive organ, the International Fund for Saving the Aral Sea (IFAS). While this appeared to be a viable structure, it has not functioned effectively, illustrating many of the challenges of regional integration:

> "Unfortunately, however, this institutional framework is not really governing the region's waters. There are numerous unresolved disputes and tensions over water among the Central Asian states and some of their neighbours. The IFAS-ICWC system is not functioning effectively for a number of reasons. The most important one is that these institutions have mainly been created under the impulse of international agencies (in particular the World Bank) and states have been quite reluctant to cooperate. The result is that many commitments and agreements are not honoured. Furthermore, mutual suspicion obstructs constructive engagement. The management of the ICWC is currently dominated by officials from Uzbekistan, leading to suspicions that it favours that country's national interests. Additionally, cooperation among the states still depends on relations among individual heads of state; most decisions are taken during bilateral talks between presidents rather than through regional arrangements. The last major problem is the lack of coordination between development agencies, which are all developing different projects at different levels. Competing and multiple donor aid programmes conducted in isolation from each other diminish the potential role of IFAS-ICWC. As a result, the governance system for Central Asian waters has more or less come to a standstill. "

The situation was not helped by the crude nature of the original agreement, which had been imposed by Soviet central authority:

> "… the water/electricity and natural gas allocation scheme established during the Soviet Union and preserved by the 1992 Almaty Agreement …. originated as a Soviet political strategy "used by Moscow planners to 'divide and rule' Central Asia" by forcing reliance upon the central planners in Moscow. Under the plan, "[t]he upstream states of Central Asia (Kyrgyzstan and Tajikistan) released water during the spring and summer" free of charge to irrigate crops in the downstream countries and stored water during the frigid winters. The downstream states reciprocated by providing free electricity and gas from fossil fuel sources to the upstream countries "to cover domestic energy demand" in winter. (Bart 2013)

While the history would suggest that there is the potential for new benefit sharing arrangements to be negotiated, this has not, in itself, been enough to promote agreement. This is perhaps due, in part, to the path dependency in which the cost of moving to new arrangements is simply too high for some of the parties. There are also other political tensions that override the water sector's sectoral bargaining. However, the Central Asian case provides an empirical demonstration of the fact that water management does not necessarily lead to regional integration and, conversely, that a failure of regional integration may rapidly lead to a failure of cooperative water management. It also demonstrates an important technical point: The mere allocation or division of water flows between states is not the only consideration in transboundary water cooperation; the timing of those releases, the coordination with other activities and environmental sustainability are also key factors to be addressed.

> In 20 years, the Central Asian states have failed to devise a common approach on the use of the region's major rivers. Energy- poor upstream states Kyrgyzstan and Tajikistan have desperately sought opportunities to construct large-scale facilities. These plans have intensified in the last five to six years, much to the discontent of downstream neighbours, especially Uzbekistan. So far, unfriendly gestures have included blocking transiting rail cars, arbitrary cuts of gas supply and occasional demonstrations by armed vehicles at the border sites. (Juraev 2013)

A source of frustration for water practitioners is that there does appear to be scope for mutual benefit:

> "Two water supply scenarios for each of two policy choices are examined. Results show that a constrained economic optimization operation of the Dam has the potential to increase farm income for each riparian country, while producing considerable benefits in hydropower for Tajikistan. Political negotiation among the riparian states and much better data will be needed to discover and implement potential gains indicated by this study." (Jalilov 2013)

What these challenges illustrate is the subsidiary role of water in the politics of regional integration as well as the dominance of national interests over the region. The situation has perhaps not been helped by the focus of external assistance on the environmental issues, with the underlying politics and economics relegated to second place. Even where there are apparently obvious societal benefits from greater regional cooperation, these will not be realized if these benefits are not a priority for the national political leadership whose interests determine decisions. The failure of water cooperation in Central Asia is thus primarily a failure of politics at national level:

> "In 20 years, the five former Soviet republics have not established robust political institutions or the rule of law. The Soviet-inherited state infrastructure can still hinder the development of civil society and private economic activities, even as it fails to provide security and/or welfare to the public. None of the Central Asian states has developed established rules of political power succession. Elections remain a formality aimed at legitimising the political decisions of the incumbent regime." (Juraev 2013)

So while "the just, efficient and sustainable management of water in Central Asia continues to pose challenges to support the region's economic and political stability" (Jalilov 2013), this will likely only be achieved once there is a modicum of political stability and regional cooperation.

> "Calls for regional integration, so typical of the 1990s, sound rhetorical today. Even so, building a peaceful and secure region will require the new generations in Central Asia to develop deeper levels of mutual exchange and to demonstrate greater openness to cooperation, rather than to tighten border controls." (Juraev 2013)

The Rhine a river shared for navigation, trade – and then pollution

Europe is emblematic of modern regional integration and the Rhine lies at the heart of the original European Union (primarily involving five countries – Switzerland, France, Germany, Luxemburg, the Netherlands – with limited overlap into Italy and Belgium). So it is appropriate to consider the contribution of that river to regional development and integration and the institutions that have evolved to support the process. Some of that historic cooperation has already been discussed above, notably the early cooperation over the use of the Rhine for transport purposes.

> "The Rhine is Western Europe's economically most important river; it has been frontier and trade route for millennia. Its course of 1,320 km runs from Switzerland through Germany, France and the Netherlands, providing drinking water for 30 million people and connecting the centres of European industries since the 19th century. The catchment is shared by nine countries, making it one of only 19 international rivers with more than five parties. International collaboration on navigation was initiated in 1815; the Central Commission for Navigation on the Rhine is Europe's oldest active organization." (Pfeiffera and Leentvaar 2013)

Maintaining open access for the transport of goods is clearly a fundamental objective of regional economic integration; trade agreements are worthless if they cannot be translated into physical exchange. However, as important was the precedent established for the institutionalization of cooperation. In this context, the legal evolution of the cooperation, as documented by Uprety (2006) also provides important precedent. Uprety cites de Visscher as suggesting that

> "… the principle of right of access to the sea visibly inspired all the international acts that are critical to the modern law of rivers. He describes the legal regime of international rivers as "the nucleus around which the modern law of communication was gradually constituted." At the outset, the law of rivers was inspired by the concept of "universalism." After the Vienna Congress, the "particularism" of riparian States began to triumph, though the objective remained free access to the sea for upstream territories. The law of rivers continued its growth with the institution of central organizations to monitor application of treaties and ensure the exercise of freedom of navigation."

It was from this basis that

> "… when the army of the First French Republic, victorious against the coalition formed by the powers of the *ancien regime*, had freed Belgium, it realized that the international rivers in its path (like the Scheldt and the Meuse) had remained closed to international trade for a century and a half. On November 20, 1792, the Executive Council of the Convention decreed the liberalization of the Scheldt and the Meuse (Arrêté du Conseil Exécutif de la France [liberté de navigation sur l'Escaut et la Meuse]), stating that the obstacles and hindrances to the navigation of and trade in Scheldt and Meuse are directly contrary to the fundamental principles of natural law that all Frenchmen promised to respect. In 1804, the Paris Convention adopted the principle of freedom of navigation on the Rhine, the most important international river in Europe. It asked for co-administration of riparian access. The solution this Convention proposed was regional and particular in form. … Article 5 of the Paris Treaty on the Rhine (May 30, 1814) emphasized free access to the sea: "The navigation of the Rhine from the point it becomes navigable up to the sea and vice versa shall be free in such a way that it shall be prohibited to none."

This approach had global ramifications:

> "… the United States invoked the decision of the Congress of Vienna to assure free navigation on the Saint Lawrence. Indeed, the triumph of this concept may be seen across the world: In the Americas, navigational freedom was proclaimed for the Amazon, Rio de la Plata, Rio Grande, and their tributaries; in Africa, navigational freedom was applied on the Congo and the Niger; in Asia, the Yan-tse-kiang was opened for foreign flags; while in Europe, many LLS born after the 1648 Treaty of Westphalia, which had divided central Europe into several States, became aware of new navigational problems. (See Agreement in 1648 ending the Thirty Year's War. The peace marked the end of the supremacy of the Holy Roman Empire and the emergence of France as a dominant power. It recognized the sovereignty of the German states, the Netherlands, and Switzerland; Calvinists, Lutherans, and Roman Catholics were given equal rights."

The substantial early progress on navigation stands in sharp contrast to the tortuous process by which agreement on modes of cooperation was finally reached on water resource management issues on the Rhine which was, by the middle of the 20th Century, widely and appropriately described as "the sewer of Europe."

> "The Netherlands, downstream and suffering most of the economic damage, lobbied unsuccessfully during the early 20th century for international collaboration on water pollution. Only three years after World War II, Dutch water diplomacy re-engaged the main war opponent, but upstream countries remained uninterested until the Navigation Commission facilitated formation of the pollution regime. The ICPR was founded in 1950 and formalized with the 1963 Berne treaty. The treaty did not include emission goals or tributaries through which most pollutants arrived, but created a permanent ICPR secretariat … A major conflict over chloride and chemical pollution shaped relations between 1950 and the 1990s, and the related efforts to negotiate and implement formal treaties are considered largely unsuccessful."

In the event, progress was only made because of a catastrophic incident which drove public opinion and political action:

> In 1986, a major environmental disaster changed public opinion and switched the regime from being 'limited, uncooperative and sometimes outright hostile to being extensive, effective and friendly' (Verweij 1999: 453). The resulting Rhine Action Programme (RAP), adopted in 1987, is considered highly successful and established the ICPR as a model for collaborative TRBM. Ambitious goals for water quality were met until the late 1990s, even though the RAP was no more legally binding than previous, less successful agreements. (Pfeiffera J and Leentvaar 2013).

The structure of the collaborative organization, the International Commission for the Protection of the Rhine (ICPR) whose members are the five main riparians and the European Commission is focused on facilitation and coordination rather than operation. It was established in 1950, primarily to deal with pollution incidents but its mandate has subsequently been expanded to include floods and other issues. There is a small core secretariat, which lists only 14 fulltime staff, with most of its work undertaken by Working Groups involving national experts. (ICPR 2014)

There is a separate Central Commission for Navigation on the Rhine, which claims to be the oldest international organization in modern history (dating back to the 1815 Congress of Vienna). Although the CCNR has significant operational responsibilities, it too has only a small secretariat of 20 people. These organisation are typical of the approach taken in such shared river contexts:

> "Many basin agencies of the "Secretariat" type, such as for the Rhine Commission, assume only the coordination, whilst the infrastructure development and operation remain in the hands of local government departments of public works or water management." (Alaerts 2003)

It is generally agreed that the quality of the Rhine waters has improved since the establishment of the ICPR and the implementation of the Rhine Action Plan. It is however too early to say whether the superposition of Europe's Water Framework Directive will complement or dilute existing programmes. Early reports are uncertain:

> Improvement of water quality in the Rhine river basin is addressed by a policy agreement with management measures from 2009 between the involved countries (nine countries, including the Netherlands, France, Germany, Luxembourg and Switzerland). This agreement (the Internationally Co-ordinated Management Plan for the International River Basin District of the Rhine) proposes several measures to reduce diffuse inputs impacting surface water (and groundwater) of nutrients and pesticides (and metals, noxious substances from historic pollution, and classical pollution of industrial and municipal origin).

> However, the current implementation status of these proposed measures is not yet clear, nor is how upstream management measures affects or improves downstream water quality. These proposed measures comprise various options such as: stimulating “good agricultural practice” with information on and the introduction of certification systems; prohibition of fertiliser distribution in autumn or winter or on water-saturated, frozen soil or soil covered with snow; keeping bank areas free of fertiliser or cultivation; prohibition of grassland ploughing during autumn and winter; cultivation of swamp areas and helophyte fields; extensification of livestock breeding; and improvement of the rate of implementation and fertilisation.” (OECD 2014)

The current uncertainty about the status of Rhine waters, together with the relatively recent mobilisation of concerted action to address specific problems resource management problems, the institutional fluidity and change in management arrangements and madates over the past few decades provide some useful insights into the challenges of shared water resource management and regional integration.

The example of the Rhine also provides two counter-intuitive lessons; first that the greatest contribution made by its management to regional integration occurred a century before the political process began; and second, that even after integration, a crisis was required to catalyse substantive cooperation between neighbours.

These lessons provide a useful point of departure for the focus on the contribution of water to regional integration in Africa in general and Southern Africa in particular.

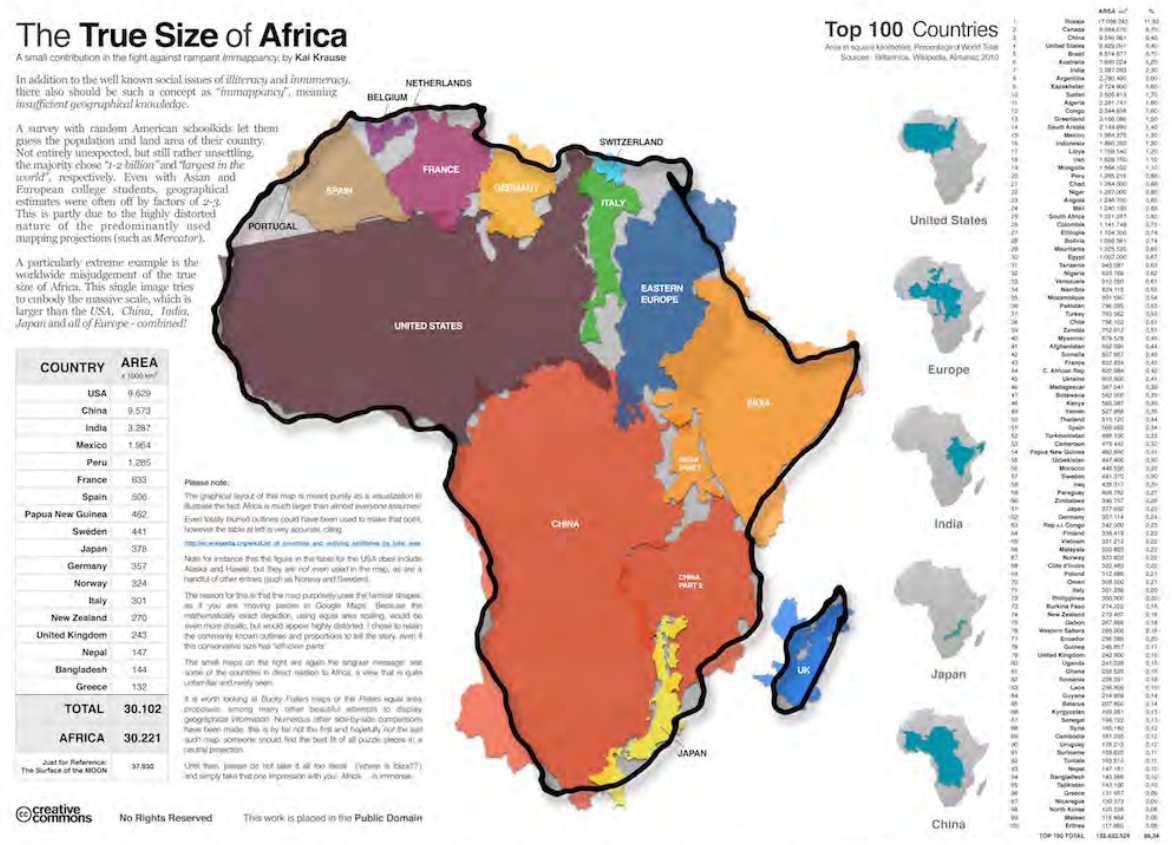
Regional integration in Africa

Introduction – the context

Before considering the contribution of water to regional integration in Africa, it is first necessary to put the process in its physical context. For a start, it is important to emphasise the sheer size of Africa. Figure 3 graphically illustrates the size of Africa compared to the major countries of the world. It shows that in terms of surface area, Africa can accommodate China, all of Europe, India, Japan and the United States.

What is also relevant is that this huge land mass is divided politically into 55 countries, not including a handful of small foreign dependencies. In terms of population, however, while the five largest countries (Nigeria, Ethiopia, Egypt, Congo DRC and South Africa) have populations ranging from 53 million to 178 millions, the smallest 25 have less than 10 million people. Finally, there are two orders of magnitude differences in economic status between oil-rich Equatorial Guinea the richest country (GDP PPP per capita US$36 600 for a population of 2 million) and land-locked Burundi (US$300 per capita for a population of almost 10 million). This fragmentation and diversity pose particular challenges for African integration.

Figure 3: The true size of Africa



A map about the complete inability of the general public to gauge the relative sizes and distances, the areas, the population ....Often there are extremely basic assumptions with distortions that would be hilarious, if they weren't at the same time so deeply sad as well...Analogous to illiteracy and innumeracy I coined the term "immappancy".

(Map by Kai Krause (available at) http://static02.mediaite.com/geekosystem/uploads/2010/10/true-size-of-africa.jpg).

Drivers and approaches to integration in Africa

The drivers for regional integration in Africa are often portrayed as primarily economic. However, as in the case of Europe, the original drivers of explicit demands for regional integration are political and cultural. In Africa, they were a response to long histories of slavery, about whose depredations there is a deep and extensive literature (see, for instance Nkrumah 1963). They also reflect centuries of a colonialism that was often careless and callous about the way in which its borders divided some communities and forced together others with few linguistic or cultural affinities.

However the appeal to an identity of common suffering in the past and common challenges in the future proved to have limited attractions when set against the benefits that could flow from within the political and administrative borders of individual nation states. Julius Nyerere reflected on the reluctance of his fellow African leaders to embrace the vision of a united Africa, in the context of the experience of Kwame Nkrumah. It is useful to recount his perspective at length:

> "Kwame Nkrumah was the greatest crusader for African unity. He wanted the Accra summit of 1965 to establish a Union Government for the whole of independent Africa. But we failed. The one minor reason is that Kwame, like all great believers, underestimated the degree of suspicion and animosity which his crusading passion had created among a substantial number of his fellow Heads of States. The major reason was linked to the first: already too many of us had a vested interest in keeping Africa divided.
>
> Prior to independence of Tanganyika, I had been advocating that East African countries should federate and then achieve independence as a single political unit. I had said publicly that I was willing to delay Tanganyika's independence in order to enable all three mainland countries to achieve their independence together as a single federated state. I made the suggestion because of my fear, proved correct by later events, that it would be very difficult to unite our countries if we let them achieve independence separately.
>
> …. I never believed that the 1965 Accra summit would have established a Union Government for Africa. When I say that we failed, that is not what I mean, for that clearly was an unrealistic objective for a single summit. What I mean is that we did not even discuss a mechanism for pursuing the objective of a politically united Africa. We had a Liberation Committee already. We should have at least have a Unity Committee or undertaken to establish one. We did not. And after Kwame Nkrumah was removed from the African political scene nobody took up the challenge again." (Nyerere 1997)

Based on the recognition that independence had created a new set of interests, the focus thus moved from an appeal to the emotional and political to the pragmatic and economic. So the African Development Bank (AfDB 2000) stated in its regional programme that the commitment to regional integration reflected the belief that a regional agenda was required to promote trade, growth and the reduction of poverty in Africa. If African integration was to be driven by the promise of mutual benefits, an economic focus, with its explicit focus on costs and benefits, was seen by many to be more appropriate and likely to succeed given the continent's constraints. In this context, three fundamental, development constraints that regional integration is expected to address were:-

- the small size of most African economies;
- the lack of structural complementarities, with most countries producing the same narrow range of low-value primary export products and minerals; and
- Africa's dependence on import of intermediate and final goods.

Interventions, whether physical or institutional infrastructure (such as regulatory frameworks, harmonized policies and efficient institutions) are intended to improve competitiveness and productivity producing economic and welfare gains. One intended outcome of integration is to ensure adequate and reliable availability of key inputs to the economy such as water, power and transport at reduced costs. This is to be achieved within

> "…. a standardised framework is often considered which begins with cooperation between countries through a free trade area, followed customs union and ends with the use of a common currency and common financial system – political union" (Peters-Berries 2010).

The ambition for regional integration has led some commentators to dismiss the importance of prior cooperation, reminiscent of the theoretical debates about the limits of functionalism. Kumalo (2012) whose perspective is informed by long observation of the interaction of Africa's leaders in the global context as South Africa's ambassador at the United Nations in the decade 1999-2009, notes that

> "…. There have been more serious challenges facing regional cooperation in Africa. The challenges are manifold. There is the challenge of sometimes confusing regional cooperation with genuine regional integration, in which states fail to pool their sovereignties for the greater regional and continental good, particularly in addressing cross-border movements and trade.
>
> Indeed, there has been lacking a sense of continental sovereignty in Africa, and national sovereignty often trumps the regional and continental. Even the African regional institutions once foreseen as bearing Africa's vision of renewal by our illustrious founders of Pan-Africanism, such as Nkrumah, Kenyatta, Nyerere, Cabral and even Mandela, have been reduced to communicating in a muted voice."

Some theoretical perspectives on African regional integration

Such comments highlight the need for a context specific approach to regional integration, for integration efforts in Africa to be influenced by its particular economic, political, environmental and cultural context. Yet thinking is often still informed by dominant theories developed primarily to explain European integration (Laursen 2008) despite warnings from a range of scholars that the EU model cannot be applicable to all contexts (Erll 2010).

So Draper (2011) recommends that Africa should develop its own model of integration that is responsive to Africa's economic and political reality. He suggests that such a model should be underpinned by a security regime and should prioritise trade and regulatory cooperation. However, Soko (2007) suggests that integration should be promoted as a way to achieve objectives such as sustained economic growth and development that cut across the economic and political spheres and deal with political fragmentation and small inter-regional markets. He warns that integration has been pursued in Africa without adequate returns on the principles of equity, interdependence and mutual benefit.

From the European model, it is often assumed that when there are conflicts of interest between regional partners and non-regional partners, trade-offs must favour regional partners. However, in Southern Africa, as a result of severe economic imbalances in SADC member states, it appears that South Africa has benefitted most from the regional integration efforts of SADC (Keane et al. 2010).

Mattli (1999) argued that market integration cannot be explained without reference to institutional factors. Draper (2011) concurs, identifying key concerns for regional integration approaches in southern Africa as its limits to the capacity to manage development processes; reluctance of major

regional states to play a leading role; and also an ability to combine good governance with intergovernmentalism, given the 'hard' sovereignty stance of some African states.

Another dimension that has attracted attention is the need to identify and engage a wider set of actors than national governments and regional integration institutions, which could help to bridge the gap between high principle and practical action.

> "There is growing demand for 'developmental regional integration.' This approach is anchored on three pillars – market integration, industrial development and infrastructure development. This high level articulation of a regional integration agenda is not new; and indeed it is persuasive. But it lacks the detail of a practical agenda that will address competitiveness challenges in the 21st century. This is an opportunity to think differently about a regional integration model suitable to practical realities. These debates should also involve private producers, traders and workers.
>
> "Interesting lessons from the Asian experience suggest that the role of the private sector is key – this should be a focal point for thinking creatively about regional integration. In Asia the flag follows trade; not the other way around as it still does in Africa, where state-led integration initiatives still predominate. If we leave the very important task of shaping a 21st century African integration agenda to states, we may miss the growth opportunities that Africa's new discoveries of resource endowments offer at present" (TRALAC 2014).

This has growing resonance for SADC where, as in other regions, despite the language of integration, national interests and opportunities have continued to dominate decision-making, to block progress in economic cooperation and in areas like energy. Such opposition is often centred in or mobilized through national governments in part because, as Söderbaum and Taylor (2008) report, most research on African integration focuses on macro-regions and inter-state formal frameworks such as the RECs.

> "Much of this work is decidedly state-centric and in general somewhat ignorant of what is actually "happening", in favour of often optimistic and unrealistic accounts about what state actors say they are going to do to build regions. In fact, there are too many studies based on the rhetorical commitments to regionalism in Africa, which – we would suggest – have little to do with the reality of regionalism on the continent today, other than exposing the profound gap between stated commitments and actual practice
>
> "Yet it cannot be denied that the formal institutional manifestations of official projects are stronger in Southern Africa than they are elsewhere, resulting in a fascinating milieu where policy-driven (formal) processes are mediated by the informal processes of neo-patrimonialism, whilst in other parts of the continent the policy-driven formal element within many regionalist schemes is barely discernible, other than on long-forgotten policy papers and treaties, leading to an almost instantaneous undermining of any real implementation of regional plans by most governments in such spaces."

From a political economy perspective, based on empirical work in West Africa, Bach (2003) came to the cynical conclusion that there were effective "trans-state networks" of power in some African regions whose interests lay in maintaining national barriers:

> "…. trans-state regional lobbies share a strong interest in the preservation of good relations between neighbouring states; but they have proved equally active in preventing the implementation of sub-regional programmes towards the liberalization of customs and tariff

> barriers since these would erode the rent-seeking opportunities associated with the preservation of barriers." (Bach 2003)

This led the researchers to consider the phenomenon of "micro-regionalisation", particularly with reference to Southern Africa and its "development corridors" (Söderbaum and Taylor 2008) in which wider groups of actors are involved. And other commentators return to the comparisons with South East Asia, whose regionalism is networked rather than institutionalized and does not just involve governments but:

> "… in which 'social forces … create multiple political connections' (Katzenstein 1996). Networked regionalism is assumed to be 'inclusive' and more effective than institutional structures in enhancing intra-regional engagement." *(*Elliott 2011)

These challenges highlight the need for African theorists and policy makers to look beyond what Bach describes as "the classic Euro- and state-centric representations of 'regional integration'. These new approaches are not constrained to focus on the geographical boundaries of the nation state. As Giraut (2011) highlights, in the case of developed countries:-

> "The expression *new regionalism* initially addressed the repositioning of the state and the politics of scale in the age of globalization. It was made for two rescaling process in Europe and North America: the governmentalization of metropolitan areas and supra state regionalization."

It is in this complex world that African countries and institutions have to position themselves. A key theoretical challenge remains to describe what a 21st century "new regionalism" might look like in Africa. For the purposes of this study, the next step is to provide some contextualization of the waters of Africa, to characterize the nature of the resource and the opportunities and constraints that it brings.

Water and development in Africa – two narratives

There is a widespread belief that the African continent faces many development challenges because it is water-scarce and so many of its rivers are shared by more than one country. This sentiment is shared across many societies by continental and regional agencies such as the African Union and Regional Institutions, national governments, academia and the broader public. The corollary is that it will be difficult to use these water resources without cooperation between the countries concerned.

There are certainly a number of cases where arguments have arisen that appear to support this view. Best known is the dispute between Egypt and other riparians over the use of the Nile. Another prominent case is the challenge of 'rescuing Lake Chad'. In Southern Africa, disputes between Namibia and Botswana have arisen over Namibia's proposed abstraction of water from the Okavango River, the region's third largest.

The belief that shared rivers are creating development challenges has driven a strategy that has focused on the development of river basin institutions which, as already discussed, have been seen in some quarters as essential institutions for water management on shared rivers.

This strategy has been informed and then heavily supported by external donors, so enthusiastically that a number of officials privately expressed concern about who was setting the agenda. The German Government's GIZ (GIZ 2014) funds water resource management related activities at continental level (AU), in the SADC secretariat as well as in four river basins (Chad, Congo, Nile and Niger) through which activities are also supported at national and local level. The French government supports the establishment of and cooperation between river basin organisations, an area in which it believes it has unique experience to offer. The World Bank also has an extensive programme of support primarily at river basin and country level. It has supported the Nile Basin Initiative since its inception and also established a specific multi-donor trust fund window, the Cooperation in International Waters in Africa (CIWA), which seeks to support

> "riparian governments in Sub-Saharan Africa to unlock the potential for sustainable and inclusive growth, climate resilience, and poverty reduction by addressing constraints to cooperative management and development of international waters. CIWA will achieve this by improving the quality and accessibility of information, strengthening institutions, and providing support for preparing and improving the quality of investments with regional benefits." (CIWA 2014)

Yet there is another narrative and an investigation of resource availability, development and use paints a somewhat different picture.

First, only a few countries in sub-Saharan Africa are actually severely water-stressed, in terms of the current availability of water per capita at national level (see Figure 4). While this measure does not account for the variability of the resource or more local challenges, it provides a first order indicator of the situation. Physical water resource shortage is thus not the dominant governance and management concern in sub-Saharan Africa generally or in its shared rivers in particular.

Second, the extent of water use is relatively low, extremely low in many cases. This is illustrated by the FAO's Aquastat reports on major basins and groups of basins. These show that the proportion of water used for irrigation in major basins varies from less than 2% in lightly used rivers such as the Congo, Zambezi and Niger rivers; to between 15% and 20% in moderately used rivers such as the Senegal, Shebelle and Orange while 69.5% of the Nile's waters are used (Table 1). Since agriculture accounts for by far the largest proportion of water used consumptively, these figures give a

reasonably accurate picture of overall availability of fresh ("blue") water and its use and show that, at a basin scale at least, a relatively limited proportion of Africa's available water is actually used.

Third, while dependence on transboundary rivers may lead to conflict, this is more likely if downstream countries are water scarce or have developments that depend upon the flow of water from upstream countries. The data shows, however, that most water scarce countries, with the exception of Egypt and Eritrea, have only a limited dependence on upstream countries (Figure 5),

Thus, while there many potential water users in Africa who do not have access to the water they need to meet their domestic needs and support their economic activities, this is not the result of physical water scarcity in shared rivers. The challenge of water management in these circumstances is the "pre-modern" one: investments are needed at local level to use the water that is available. In the absence of the necessary resources, these water users face what has been characterized as "economic water scarcity" (Seckler et al. 1999). The authors, leading researchers from the International Water Management Institute note that to meet reasonable needs, the amount of water available to these potential users would have to be doubled by 2025.

> "These countries, with 348 million people, are mainly in sub-Saharan Africa. It will be extremely difficult to find the financial and other resources to achieve this rapid pace of water development."

This finding, corroborated by many reports at national level on the scale of investment required to meet water needs, suggests that the management of shared rivers is not Africa's primary water challenge.

In these circumstances, where it is necessary to communicate between countries on water use plans, traditional models of cooperation such as intergovernmental commissions and bilateral purpose have been shown to be effective in practice. It is not obvious that river basin organizations in shared rivers, with or without delegated powers and functions, will be able to make a significant contribution to the management and development of Africa's water resources. Arguably, the traditional channels of inter-governmental engagement ensure better integration with other sectors, wider reach to the broader community of stakeholders as well as greater continuity than specialized, autonomous, water institutions.

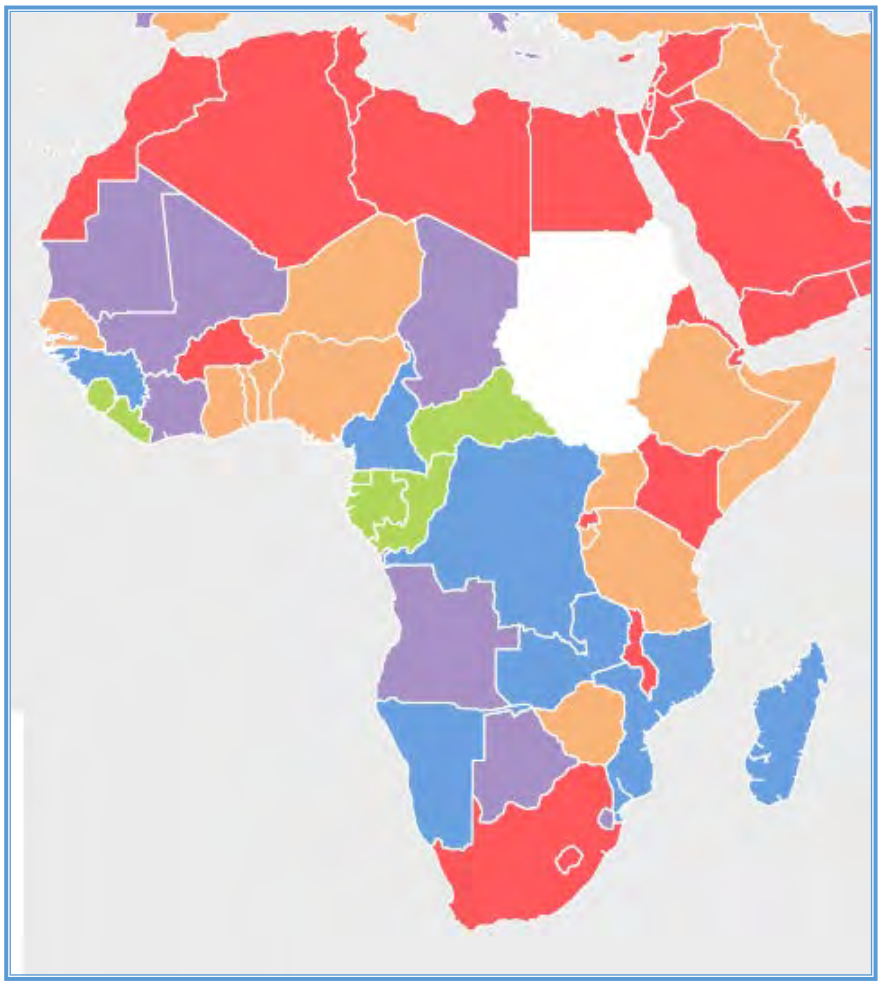
There are many examples. In West Africa, a bilateral cooperation commission between Niger and Nigeria enabled an irrigation project in Niger to proceed with water supplied from dams built in Nigeria (AfDB 2011). In Southern Africa, statements of non-objection and agreements reached at the Mozambique, South Africa and Swaziland Tripartite Water Commission helped to mobilise funding for Swaziland's Lower Usuthu Irrigation Project (LUSIP) (AfDB 2010); Zambia and Zimbabwe work through their bilateral ZRA to manage and further develop the Kariba Dam; while Lesotho and South Africa collaborate on a bilateral basis in the Lesotho Highlands Water Project on the Orange-Senqu River.

On the Nile, where it has proved impossible to achieve agreement between riparian states, some Egyptian commentators highlight Egypt's neglect of its broad relations with African countries and believe that this failure to maintain general cooperation has exacerbated conflicts over water (Nkrumah 2012). Meanwhile, with the exception of the controversy over Ethiopia's Grand Renaissance Dam, countries are still pursuing national and regional water development programmes in the shared Nile Basin without major impacts on or complaints from other riparians.

The tension between the two discordant narratives is explored below in more detail in the context of Southern Africa. But first, it is helpful to consider the other set of discordant narratives, those that deal with approaches to regional integration and how those have played out in Southern Africa.

Figure 4: Scarcity? Africa's total renewable water resources per capita (actual)

(m3/inhab/yr)



7-1,400 South Africa, Lesotho, Malawi, Kenya, Rwanda, Eritrea, Burkina Faso Morocco, Algeria, Tunisia, Libya, Egypt

1,400-3,200 Zimbabwe, Tanzania, Burundi, Somalia, Ethiopia, Nigeria, Niger, Benin, Togo, Ghana Senegal

3,200-7,600 Swaziland, Botswana, Angola, Chad, Cote Ivoire, Mali, Mauritania

7,600-23,000 Namibia, Mozambique, Madagascar, Zambia, DR Congo, Cameroon, Guinea, Guinea Bissau

23,000-530,000 Congo, Gabon, Central African Republic, Eq. Guinea, Liberia, Sierra Leone

Ex: http://knoema.com/atlas/topics/Water/Total-Renewable-Water-Resources/Water-resources-total-renewable-per-capita?type=maps

Source: FAO AQUASTAT 2013

Table 1: Water use in Africa's major basins and sub-regions

Name of the basin	Area in km2	Natural runoff (without irrigation) in Mm3/yr	Net irrigation water use in Mm3/yr	Total runoff (with irrigation) in Mm3/yr	Irrigation water use as percentage of natural runoff
Central West Coast	714,642	524,636	17	524,619	0.00
Congo River Basin	3,712,787	1,290,086	175	1,289,911	**0.01**
East Central Coast	1,039,479	113,603	480	113,123	0.42
Indian Ocean Coast	641,821	66,507	1,380	65,127	2.07
Lake Chad Basin	2,416,210	0	603	-603	
Limpopo Basin	415518.00	5362	1019	4343	**19.00**
Madagascar	601,286	329,696	1,628	328,068	0.49
Mediterranean Coast	571,706	21,982	4,782	17,200	21.75
Niger River Basin	2,136,780	220,332	3,485	216,847	**1.58**
Nile Basin	3,109,223	63,620	44,233	19,387	**69.53**
North East Coast	780,854	1,824	1,006	818	55.15
North Interior	5,697,480	0	6,681	-6,681	
North West Coast	757,141	19,875	7,055	12,820	35.50
Orange Basin	968605.00	7890	1131	6759	**14.33**
Rift Valley	641,505	0	776	-776	
Senegal River Basin	433,958	15,262	808	14,454	**5.29**
Shebelli & Juba Basin	805088.00	8083	1328	6755	**16.43**
South Atlantic Coast	372,734	4,734	887	3,847	18.74
South Interior	876,152	0	31	-31	
South West Coast	502,580	50,683	79	50,604	0.16
West Coast	1,436,820	662,667	573	662,094	0.09
Zambezi Basin	1,388,476	107,860	739	107,121	**0.69**
Total	**30,020,845**	**3,514,702**	**78,896**	**3,435,806**	

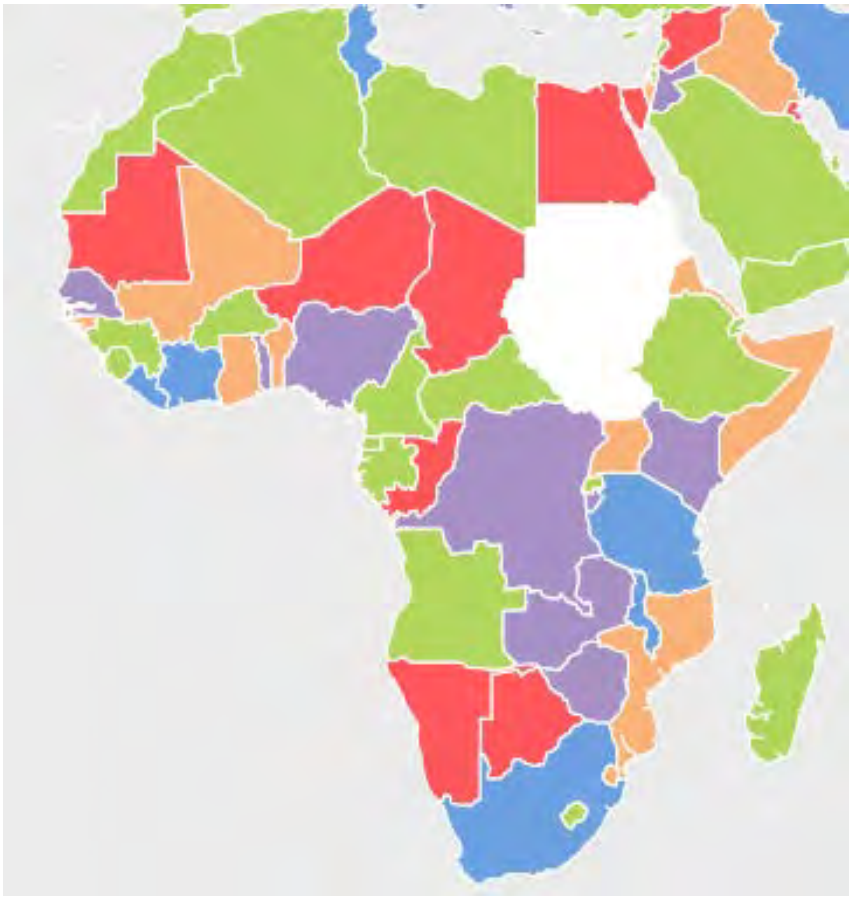
LEGEND

Irrigation Use as % of available water **0-5%** **5-10%** **10-20%** **20% +**

(source: Aquastat http://www.fao.org/nr/aquastat)

Figure 5: Africa Water Dependency ratios (%)

Indicator expressing the percent of total renewable water resources originating outside the country. This indicator may theoretically vary between 0% and 100%. A country with a dependency ratio equal to 0% does not receive any water from neighbouring countries. A country with a dependency ratio equal to 100% receives all its renewable water from upstream countries, without producing any of its own. This indicator does not consider the possible allocation of water to downstream countries.



% .

65-100	Namibia, Botswana, Congo, Chad, Niger, Mauritania, Egypt
39-65	Swaziland, Mozambique, Uganda, Somalia, Eritrea, Benin, Ghana, Mali, Guinea Bissau
16-39	Zimbabwe, Zambia, DR Congo, Burundi, Kenya, Nigeria, Togo, Senegal
4.4-16	South Africa, Malawi, Tanzania, Cote Ivoire, Liberia, Tunisia
0-4.4	Lesotho, Madagascar, Angola, Rwanda, Gabon, Cameroon, Eq Guinea, CAR, Sierra Leone, Guinea, Burkina Faso, Ethiopia, Morocco, Algeria, Libya

Ex:- http://knoema.com/atlas/topics/Water/Total-Renewable-Water-Resources/Dependency-ratio?type=maps, Source: FAO AQUASTAT 2013

Regional integration in Southern Africa

The way in which Southern Africa has engaged as a region with the challenges of developing, managing and using its water resources, can only be understood with reference to the broader process through which the region emerged as a political construct and an administrative reality. As with the story of the contribution of water to African development, there are two narratives but they are sequential rather than parallel although the first version continues to have resonance.

In their origins, the predecessor structures of today's SADC (the Southern African Development Community) were designed to reduce integration with its most powerful member, South Africa. The structures were organized to address the immediate practical challenges faced by the other countries. When it became clear that a democratic government would be established in South Africa, the goals changed dramatically which required an entirely new narrative and structure of cooperation.

Approaches to regional integration in Southern Africa

The achievement of democracy in South Africa enabled and indeed required a change in approach to the promotion of regional integration in Southern Africa. The approach adopted was rather formulaic and mechanical, perhaps reflecting Southern Africans' own perceptions about the process of European integration as well as the substantial assistance that they received from the European Union and its individual member countries.

SADC was established in 1992, shortly after Namibia achieved independence in 1990 and at a point at which it appeared that the changed circumstances that would be created by the achievement of democracy in South Africa in 1994 were already irreversible. This required a fundamental redirection of the strategy of the Frontline states (established in 1970) over the previous two decades. Their focus had first been to free the remaining colonies. In 1980, once the achievement of this goal was in sight, they reconstituted themselves as the Southern African Development Coordinating Conference (SADCC) to address economic goals, specifically to reduce dependence of the region on South Africa. On the eve of Zimbabwe's independence they spelt out their aims in the 1980 Lusaka Declaration. This was an explicitly political document, which located economic cooperation as an addition to previous strategies:

> "We, the majority-ruled States of Southern Africa, recognize our responsibilities, both as separate nation States and as a group of neighbouring majority-ruled African countries, to assist in achieving a successful culmination of our struggle. *Our urgent task now is to include economic liberation in our programmes and priorities.*" (emphasis in the original) (SADCC 1980)

The political objective was to achieve "the reduction of economic dependence, particularly but not only, on the Republic of South Africa". It was to do this through a strategy that would focus on transport and communication and committed to establish "a Southern African Transport and Communications Commission to coordinate the use of existing systems and the planning and financing of additional regional facilities."

Other sectors were also addressed, including:- trade, "to build up a regional trade system based on bilaterally negotiated annual trade targets and product lists"; environmental protection and food security, for which a number of measures were proposed; mining, industry, energy and agriculture for which it was agreed "to stimulate the exchange of information aimed at achieving a concerted policy; and "special attention to the sharing of training and research facilities".

Just two lines were devoted to water:- "… we will undertake concerted projects in order exploit natural resources, in particular those of common hydrological basins." (SADCC 1980).

However, if the origins of Southern African cooperation were primarily political, the approach adopted a decade later to the establishment of SADC in 1992 marked the formal initiation of efforts to promote Southern African regional integration, as opposed to the SADCC goal of "the reduction of economic dependence … on the Republic of South Africa". As such, its approaches reflect the primary explicit programme to promote regional integration and must be interrogated in detail.

Without its resistance focus, there was little appetite to consider the more difficult questions that now lay exposed about the different political approaches of the members of the new regional organization, the extent to which they were prepared to sacrifice their hard won national sovereignty and the challenge of dealing with the economic dominance and wealth of South Africa. So the focus of regional cooperation now turned to the apparently less challenging area of economic integration. As summarised by the organization itself in the RISDP, its 2003 long-term strategic plan:-

> "SADC opted for a development integration approach which recognises the political and economic diversities of regional integrating countries including their diverse production structures, trade patterns, resource endowments, development priorities, institutional affiliations and resource allocation mechanisms. It addresses many of the production, infrastructure and efficiency barriers arising from the underdevelopment of the region. This approach also has the advantage of complementing trade liberalisation with sustainable corrective measures, designed to cushion the least developed member countries against shocks arising from the removal of trade barriers. It further allows member states to define the scope and sectors of cooperation and to identify appropriate strategies and mechanisms to overcome impediments to integration and to address regional imbalances between member states (SADC 2003).

A timetable was set out that was drawn straight from an integration textbook, proposing a process that reflected the history of Europe's integration. There was little reference to the original political drivers behind the SADC strategy, as Schoeman has noted:-

> "Classical economic integration theory would have it that regional integration is an economic process occurring largely as a result of greater interaction between neighbouring states, functioning almost like some kind of invisible hand. This theory is based on the historical example of the development of the European Union, yet it completely discounts the fact that the European Union was first and foremost a political project. Such also has been the case with the Southern African Customs Union (SACU), the world's oldest customs union, and with the Southern African Development Cooperation Conference (SADCC) and its successor, the Southern African Development Community (SADC). (Schoeman 2002)

The Regional Indicative Strategic Development Plan (RISDP) was agreed by SADC heads of state to structure and guide the institution's work at both Secretariat and member state level. Its stated purpose was "to deepen regional integration in SADC. It provides SADC Member States with a consistent and comprehensive programme of long-term economic and social policies. The RISDP set ambitious targets which included;-

> Target 1: Free Trade Area – 2008
>
> Target 2: Completion of negotiations of the SADC Customs Union – 2010;
>
> Target 3: Completion of negotiations of the SADC Common Market – 2015;
>
> Target 5: Macroeconomic convergence on

- Inflation rate for economic integration
- budget deficit to GDP ratio
- Value of public and publicly guaranteed debt

Target 7: The establishment of a SADC monetary union by 2016

- Preparation of framework for a SADC Central Bank by 2016;
- Launch of a regional currency for the SADC Monetary Union by 2018.

Figure 6: Southern Africa's regional integration timetable

(from http://www.sadc.int/about-sadc/integration-milestones/)

The RISDP also set specific trade targets including for a substantial increase in intra-regional trade to at least 35% by 2008.

Underlying this apparently technical approach was a major ideological concession which reflected Africa's weakness in an era of structural adjustment during the brief period in which it seemed that, with the collapse of the Soviet Union and the socialist bloc around it, global politics had become "uni-polar". This concession was perhaps best reflected in the principles outlined by the African Development Bank in 2000 (AfDB 2000) which emphasized the objective of promoting "open regionalism" – a political choice to engage freely with the global economy rather than to develop economically as a region behind protective borders, a Washington Consensus approach rather than a more autonomous regional approach such as those attempted by various Latin American countries (Riggirozzi,) and advocated by self-styled anti-imperialist theoreticians. This was explicit in the guiding principles for the AfDB's policy on economic cooperation and regional integration, based on policy work and practical experience, which included:-

- Open regionalism, with a focus on integration into the global economy as well as integration of regional economies;

However, it was also distinguished by a generally pragmatic approach, calling for:-

- Progressive integration using variable geometry approaches adopting a flexible, bottom-up, approach rather than focusing on a single normative model;

- Rationalizing the plethora of regional integration activities into a more coherent set of interventions

SADC: – the institutionalisation of formal regional integration

Southern Africa's initial institutional approach reflected this pragmatic and bottom-up approach. The SADCC institutional framework was a relatively informal country-based approach in which each member was given responsibility for a development portfolio. In the early 1980s, the organisation's economic work was organised in seven programmes, covering:

- energy conservation and development;
- food, agriculture and natural resources;
- industry and trade;
- human resources development;
- mining;
- tourism; and
- transport and communications.

The political dynamic can be seen in the 1981 allocation of portfolios. Thus Mozambique was responsible for the strategic area transportation and communications, Angola for energy conservation and development, Zimbabwe for agriculture while Lesotho took the Soil and Water Conservation and Land Utilisation (SWCLU) programme. With the growing interest in the environment and preparations underway for the 1992 World Summit on Sustainable Development, the SWCLU was given a greater focus on the environment. Shortly before the establishment of the SADC, the SWCLU was transformed into the Environment and Land Management sector (SADC-ELMS) (SARDC 2001).

In August 1996, as part of initial reorganisation after the establishment of SADC, food, agriculture and natural resources was separated from the environment, which remained a Lesotho mandate and a new water resources Sector was established with both environment and water resource sectors continuing to be coordinated by Lesotho each with their own council of ministers.

The next phase of restructuring saw a radical shift in approach to a more formal institution. Although a SADC headquarters had been established in Gaborone in 1982, it was only in 2000 that the entire SADC secretariat was moved to Gaborone, now including all the individual sectors. The organization moved to a new headquarters building in 2009. Over this period, through a 2001 amendment to the original SADC Treaty, responsibility for political, defence and security issues were assigned to the deliberately distinct separate "organ".

The 2001 re-organisation brought SADC's 21 sectors together and grouped them into four directorate clusters at the Secretariat. Technical sector work is now organized under a Deputy Executive Secretary for Regional Integration who oversees the directorates of:

- Trade, Industry, Finance and Investment
- Infrastructure and Services
- Food, Agriculture and Natural Resources

- Social and Human Development and Special Programmes
- Policy Planning and Resource Mobilisation

Within this, the water sector unit is currently located in the infrastructure directorate although it has also been associated with the directorate responsible for food, agriculture and natural resources, with which there is significant overlap.

"The Directorate's activities are co-ordinated by six thematic units that were identified in the RISDP, the blueprint for development action in SADC:

- Energy – focusing on electricity and hydropower development;
- Tourism – promoting tourism investment for infrastructure and products;
- Transport – providing strategic support to transport corridors & spatial development initiatives, roads & road transport development, railway infrastructure, air transport & aviation, maritime concerns, and ports & inland waterway development;
- Water Resources Management & Sanitation – supporting and facilitating integrated water resources management, water-related infrastructure, access to clean drinking water and sanitation;
- Meteorology – including a Regional Observation Network, global telecommunications systems for meteorology and Regional Climate Data Processing Centre; and
- Communication – Information and Communications Technologies (ICT) and telecommunications." (SADC 2014a)

This arrangement has the advantage of locating water together with infrastructure related activities; its disadvantage is that the two major "water-user" sectors of agriculture and environment fall under separate management, a division that creates challenges of coordination and encourages a "hydro-centric" approach. The infrastructure focus is also on connectivity, linking national networks of road, rail, energy and telecommunications to strengthen regional networks. Water does not fit this approach since, as already noted, shared rivers provide a natural connecting infrastructure and the primary infrastructure requirements are within countries rather than between them.

Current status – time for a review

Progress on the implementation of the RISDP has recently been reviewed and the conclusions have not been very encouraging. Aside from the establishment of a Free Trade Area, the economic targets have not been met and appear unlikely to be met in current circumstances. As the SADC's own internal review concluded:-

- Imbalance in regional trade has continued as other countries have failed to diversify their economies and grow manufacturing base. Instead Extractive production and exports have grown while manufacturing has been shrinking.
- Targets for liberalising trade in services have been missed yet this are offers more growth opportunities than opening goods trade.
- Programs in finance and investment integration are not been driven by RISDP but mainly by national prerogatives which could affect continuity and sustainability
- Major targets such as establishment of SADC Customs Union, Common Market and Monetary Union are in doubt. These will have to be done in post RISDP programme (SADC 2012a).

There is limited public awareness – or interest – in the progress of SADC's regional integration agenda. Among practitioners, there is a belief that it has not been successful to date.

> "The regional integration agenda has, however, not yet succeeded in designing meaningful strategies to achieve the desired industrial development goals. It appears that the search for policy instruments to support value addition remains trapped in a conventional paradigm of import protection, export restrictions and local sourcing requirements rather than participation in competitive global value chains. Overcoming policy coordination problems at the regional level remains a key challenge to reap industrial development benefits from enhanced regional integration.
>
> "It appears that 'new thinking' is required if regional integration in SADC is to be a vehicle for enhancing competitiveness. The mid-term review of the SADC Regional Indicative Strategic Development Plan (RISDP) avails the region an opportunity to appraise its approach to regional economic integration commensurate with the demands of the 21st century trade and production realities. (Hartzenberg and Kalenga 2014)

In other areas, notably the infrastructure sectors, the assessments were less critical. Where institutional or process goals had been set, these were reported to have been achieved. But in key areas, obvious failures were ignored. As one practical example, an "independent" mid-term review of the infrastructure units recognized that

> "The region is constrained by power deficits since 2007 and nearly all MS have applied load shedding to varying degrees at the time of the RISDP MTR. In 2012 the SADC supply-demand deficit registered 7709MW and due to delays in implementation of planned projects, the deficit is only expected to be addressed by 2016 when surplus generation capacity is expected to be available. There is, however, no guarantee as projects tend to be delayed for political, financial and technical reasons." (TRADES 2013)

Despite the region-wide power shortages after 2007 that impacted many of the economies of the region, the review concluded that most of the energy sector's objectives had been achieved. Related to this, the internal RISDP assessment reported that "extremely good progress had been made" against the objective of "sustaining an enabling environment for water resources development" and that the objective had been "fully achieved". Yet many of the delay and implantation failures were for hydropower projects which were amongst the water sector's main priorities. And, almost in parenthesis it was noted that

> "Very little visible progress has been made in respect of meeting the target of developing the sufficient water resources infrastructure needed to double land under irrigation by 2015. There do not appear to be any coherent action plans and associated monitoring and evaluation system in place that would allow the goal directed achievement of this target. In addition, there appear to be no initiatives in place that aim at the development of action plans sufficient to address the impacts of such a proposal on the scarce water resources within the region."

While this latter example may primarily be the result of failures in the agricultural sector, what it highlights is the absence of integration at Secretariat level to recognize and address strategic inter-sectoral challenges. Nevertheless, the overall formal conclusion of the RISDP review with respect to the water sector (which reports mainly the views of the stakeholders involved) was that:-

> "Significant progress has been made in implementation of the RISDP water programmes, particularly in building regional policy/strategy (regional water policy/strategy) and institutional frameworks (RBOs). Capacity building on IWRM has also been built to a large

> extent. Outstanding achievements are with regard to ensuring complete harmonization of MS policies/legislation, implementation of infrastructure projects in both MS (e.g. Water Supply and Sanitation, dams etc.) and transboundary projects e.g. inter-basin transfers“ (SADC 2012a).

It appears that what is playing out in practice is the tension noted in theory between institutional and functional approaches to integration and that there is growing impatience with the focus on institutional roles at the expense of action and results:

> “The remaining period of the RISDP should therefore focus on translating policies into action. One message from across the breath of the regions key stakeholders was unanimous ... “that SADC should maintain its niche by returning to its roots namely to focus on original objectives of development integration where top priority is industrialization, economic diversification and infrastructure development, the necessary conditions for economic transformation“ (SADC 2012a).

As one senior SADC official put it (personal interview 2013), regional integration would be more effectively encouraged by practical examples that showed its value than by top-down institutional development:

> “The timing for intervention is right. SADC recognises that there is a need for change and is seeking to understand the issues and options (interview with senior SADC official).

In his view, the review of the RISDP was providing the opportunity for change. “SADC recognises that there is a need for change and is seeking to understand the issues and options”. A reviewed RISDP is to be considered in mid-2015 that will have greater focus on practical steps such as the promotion of industrialization and a process is beginning to develop a new Vision 2020 for the region.

Two parallel if related narratives can thus be identified in Southern Africa’s regional integration. The formal process of structured reform of economic institutions has failed to meet its targets and is being challenged. There are growing demands for visible action that has a practical and visible benefit for SADC’s collective of members. Against this background, a review of approaches to water management in SADC is not just timely, but also strategic.

Water resource management in a Southern African regional context

It is evident that the approaches that have been taken to promote integration in Southern Africa have had a significant impact on the way in which water matters have been addressed in the region. It is also evident that the perspectives that have guided the regional approaches to integration have reflected extensively those of their primary European development partners, who have funded much of the work. It has been shown in the section above on global approaches to water management that these partners have also engaged very actively in global water policy approaches and have sought to promote their normative positions on the subject, not least in the SADC region.

This background provides some perspective on the trajectory of regional collaboration on water resource development and management over the past four decades as well as the outcomes that have resulted. In turn, the successes and challenges of the water sector are not just illustrations of the broader challenges that have faced the region's integration processes. They also provide pointers towards different approaches that might be considered in the future.

Historical context and approaches

"Colonial regionalism" and Mar del Plata management

In the second half of the 20th century, the South African and colonial governments engaged in concerted efforts to develop the region's water resources to support economic growth and achieve other strategic goals. There was significant cooperation in water resource development during this colonial period. On the Zambezi, the Kariba Dam was developed by the Federation of Rhodesia and Nyasaland and the project continued under the authority of the Zimbabwe River Authority after the breakup of the Federation and the eventual independence of Zambia and Malawi. Although an important source of power for Zimbabwe and Zambia, and a small but useful tourist industry, there was little development of irrigation and, until recently, only limited management for flood protection and environmental conservation downstream.

In 1964 the Portuguese and South African governments signed a treaty to govern their management of shared rivers, an example of a pragmatic and low-administration approach to water cooperation[3]; in 1969, a specific agreement was reached for the development of the Cunene River including water supply to what was then South West Africa (now Namibia) as well as hydropower to serve the needs of both southern Angola and Namibia. Although its immediate focus was on the Cunene, between Angola and Namibia, cooperation between the two countries covered shared rivers in both Portuguese West Africa (Angola) and Portuguese East Africa (Mozambique).

A further project in which Portugal cooperated with South Africa was the development of the Cabora Bassa hydropower dam on the Zambezi river in Mozambique. Although this river was not shared with South Africa, the project was designed to supply electricity to South Africa and would not have been possible without that market. The dam was also intended to serve the strategic objective of providing a barrier (both physical and in terms of additional settlement and transport infrastructure) to defend the colony and prevent the southward spread of the Frelimo insurgency. In the context of the present study, it is an important example of the scale of water based development extending well beyond the river basin and involving a variety of other sectors.

During the final phase of the colonial period in the 1980s, some programmes of colonial regional cooperation continued, driven by South Africa's apartheid regime. An example of this was the

[3] Agreement between the Government of the Republic of South Africa and the Government of the Republic of Portugal in regard to Rivers of Mutual Interest and the Cunene River Scheme signed on 13 October 1964, to which the Republic of Mozambique succeeded in 1975 and the Kingdom of Swaziland acceded to in 1967.

programme initiated under the aegis of a joint agency, the Komati Basin Water Authority (KOBWA), in which Swaziland and South Africa cooperated in the development of the Komati river with one dam each in Swaziland (Maguga) and South Africa (Driekoppies), from which Mozambique was excluded.

The final major project initiated before 1994, under the pre-democratic regime, was the Lesotho Highlands Water Project (LHWP). The LHWP is usually incorrectly described as a water-sharing agreement; in fact it transfers water that would normally flow down the main stem of the Orange-Senqu River to South Africa's main water demand centres, which lie in the Vaal River sub-catchment. The countries share the cost-saving benefits that result from transferring water from Lesotho, rather than pumping it up from the lower and more distant point at which the river enters South Africa.

During the colonial period, water resource management was guided by the same assumptions that were outlined in the Mar del Plata recommendations. Many South African specialists had trained in countries like the USA and developed long standing technical collaborations (personal communications with US and South African engineers). While some commentators have suggested that South African policy of the time was not informed by the UN Water Conference in Mar del Plata (Turton et al. 2007), the converse is more likely. The report of the 1970 Commission of Enquiry into Water (South Africa 1970) already identified many of the critical issues and outlined possible responses that were addressed in a more general context in the report and recommendations of Mar del Plata.

In this period, planning was essentially technically based, institutions were established to meet specific operational needs in a manner that coordinated across user sectors; resource management was identified as being as important as infrastructure development with conservation and economic instruments identified as important areas for intervention; stakeholders' interests were considered but did not determine decisions; national strategic considerations (in this case, the strategic water security of the South African state and support for the protection and expansion of its strategic partners) continued to be dominant; but cooperative relations were fostered where this was mutually advantageous. In many ways, the approach adopted in the water sector was a leading example of the dominant techno-ideological paradigm of the time which in turn informed the approaches proposed at Mar del Plata.

In many of the Southern African cases cited, the outcomes appear to have validated the approaches. Indeed in most the benefits appear to have been sufficiently robust to have transcended the political changes from the oppressive context in which they were initiated to the present.

Thus the Kariba Dam has continued to be an invaluable source of electricity for both Zimbabwe and Zambia – although the breakup of the federation delayed the completion of Zambia's north bank generators by some decades. Production from the Cunene scheme was also interrupted for many years because of the war between South Africa and liberation movements but the infrastructure is still in place and proving to be invaluable. Development of South African dams on the Orange-Senqu River has enabled irrigation expansion in both South Africa and Namibia.

With Cahora Bassa, while the construction of the dam was opposed as a matter of policy, Mozambican's Frelimo fighters were under strict instructions not to damage the infrastructure during its construction because it was regarded as an important asset for an independent Mozambique (personal communication, Dr T. Salomao). Ownership has now been transferred from the Portuguese owner to the Mozambican government on terms very favourable to the latter due to South Africa's insistence that it would not re-negotiate the tariff until transfer was complete – thus

ensuring that the benefit of transfer went to Mozambique instead of to the former colonial master – one of the few cases in which the costs of a colonial project were transferred to the colonial power while the benefits accrued to the country itself (and see below).

The first phase of the Lesotho Highlands water project is internationally recognised as an example of win-win benefit sharing, again one of a relatively limited set of water resource developments in which the benefits have been clearly identified and costed and then shared between the developers of the project. To the extent that there has been opposition to the scheme, this is either at the micro community level, where affected residents object to compensation arrangements or at the macro-political level where opposition parties seek advantage by criticizing the terms of the agreement.

These schemes have sometimes been cited as examples of the successes of colonialism or historically racist regimes. However, their robust performance – and replication – under completely different political regimes testifies to the robustness of the technical approaches to water resource development and management that were prevalent at the time.

The Frontline States campaign against colonial hydropower and its aftermath

In Southern Africa, it was the *de facto* political integration of the colonial period that saw the promotion of projects such as the Kariba Dam on the Zambezi River. Alliances between the colonial powers and the government of pre-democratic South Africa in response to the spread of independence movements also promoted cooperation between Portuguese government and South Africa which led to the Cabora Bassa and Ruacana projects on the Zambezi and Cunene rivers, respectively.

Kariba was one of the first projects to trigger concerns about the environmental and social impact of large dams (Scudder and Colson 1972). The delay in the construction of the North Bank power stations, due in part to the breakup of the Central African Federation, also led to more rapid than expected erosion of the dam's plunge pool which is only now being remedied, facilitated by the diversion of low flows through a 2012 expansion of the North Bank power station which further reduces flows in the main stream of the river. With the refurbishments and further expansion of the generation systems, Kariba's life is now projected to be at least a further 50 years (AfDB 2014b).

The Cabora Bassa project was a text-book example of the use of water to promote economic development, albeit skewed to meet colonial interests and objectives. The project was part of Portuguese strategy to use the development of water resources to create the conditions to sustain their colonial power. The immediate aim was to create a new line of defence against the advance of FRELIMO in the then sparsely populated Zambezi valley. The plan was then

> "… to change these conditions and to turn the Zambesi valley into a densely populated industrial and agricultural area. Together with the industrial development made possible by the Cabora Bassa project will go a network of roads and airfields. Above all, development will provide subsistence for a densely settled population. Portugal plans that this will be a population of white immigrants and that they will be trained as a para-military defence force." (World Council of Churches 1971).

Not only was the valley was rich in minerals, coking coal, iron ore, manganese, nickel and chrome to provide the basis for industry but there was also scope to irrigate over one and a half million hectares of some of the richest land in Mozambique.

While this project might have appeared to be over-ambitious for one of Europe's poorest countries, a number of powerful allies were ready to provide support. The US government had long focused on

the promotion of dam building in support of industrial development, modelled on the example of the New Deal Tennessee Valley Authority (TVA), as a way to help its Cold War allies resist local opposition (Ekbladh 2002). European countries were keen for their industries to gain a share in the business opportunities that were on offer. There was too an important regional ally for whom Portugal's success in containing Frelimo's struggle for liberation was strategically important. As the World Council of Churches' anti-Cabora Bassa campaign report noted:

> "South Africa has a critical interest in the maintenance of Portuguese rule in Mozambique. White-ruled Mozambique forms a buffer between South Africa and countries like Zambia and Tanzania to the north, which provide a friendly base for South African freedom fighters."

Large hydropower projects are only financially viable if their output is fully used from the start and the proposed Cabora Bassa dam was large; it remains one of Africa's five largest hydropower schemes, by both storage capacity and by generating capacity. South Africa enabled Cabora Bassa to be built by committing to purchase the bulk of its initial electricity production.

It is a matter of record that, although the "stop the dam" campaign gained considerable support and some European companies were persuaded to withdraw, it was not enough to prevent the project from being completed. The irony was that the project's completion coincided with the collapse of Portuguese colonialism and Mozambique's independence. This meant that the dam no longer served its colonial purpose but could rather become a national asset for the newly liberated country.

Shortly after Mozambique's independence, there was a demonstration of the wider role that the dam could play beyond simply producing power for sale. In 1978, there were serious floods in the lower Zambezi Valley, below the Cahora Bassa dam, which killed some hundreds of people, displaced perhaps 100 000 others, destroyed extensive tracts of crops and seriously undermined the foundations of the strategic bridge across the Zambezi at Tete (Vaz 2000). These floods were aggravated by the operation of the dam and by delays in communication between operators of Kariba and Cabora Bassa. Specifically, it was suggested that the dam was being operated to maximise power generation. For this, its waters were maintained at a high level during the flood season (to maximise power generation) and thus, when a flood occurred, operators had to allow it to pass through by opening flood gates rapidly, to their full extent.

Yet dams can also be used to mitigate flood. To do this, the operating rules need to provide for a drawdown of water levels at the start of the rainy season to ensure that sufficient volume is available to absorb the additional water, reducing the downstream flow rate. After the 1978 flood, the operating rule was revised for this purpose at Government's insistence although one consequence was a small but significant reduction in power generation (personal communication, official of Mozambique's National Water Directorate). As a consequence, the impact of subsequent major floods has been much reduced – helped too by the more effective early warning and disaster management systems that had been put in place (Lucio et al. 2007).

This development hinted at a more socially oriented approach to the management and use of the resources of the Zambezi. However, until apartheid had been ended, there was limited prospects for SADCC's 1980 Lusaka vision of further developing the energy resources of the Zambezi, since South Africa remained the only country with a market large enough to absorb the output of a large new project.

From Frontline States to SADCC's economic independence

As already described, following the achievement of independence in Zimbabwe in 1980, the focus of the independent Southern African countries, the "Frontline States" was expanded from the

essentially political objective of supporting the independence struggles of former colonies to closer cooperation in the economic domain while confronting the final challenge posed by the white minority regime in South Africa.

With the focus of SADCC now expanded to include economic matters, some attention was paid to water in the conferences which led to its formation. As preparation for the launch of the SADCC, ministers of the Front Line States had already, in 1977, convened and commissioned a set of background papers on economic issues. The compilation of these papers, published in 1981, included a chapter on energy, water and mineral resources (Nsekela 1981). It is worth reflecting in some detail on the approaches outlined in this document since they outlined the framework in which regional cooperation should occur:-

> "Policy options for interstate development cooperation activities must be seen over time and in the light of:-
>
> a) Their political viability for each cooperating state and for the group as a whole;
> b) The volume, nature and interstate distribution of their political and economic benefits and costs;
> c) Their political and economic priorities. That is, ***will the scarce human and financial resources expended provide net political and economic benefits greater than the use of those same resources in alternative (nationally oriented) ways***?." [emphasis added]

As well as the technical issues, the chapter on energy, water and mineral resources details many of the overarching "common cause" considerations that would affect regional cooperation and coordination, including:- a sense of helplessness in the face of the dominance and vagaries of the international economy; political frustration over the narrow range of options, given the continued power of South Africa, transnational companies and aid agencies; the dearth of human and financial resources; the "humiliating process of seeking and receiving external multilateral and bilateral aid which then often appears to serve the objectives of the donor more directly than the recipient"; similarly, "the psychologically uncomfortable awareness that the skilled expatriate remains central to the evolution and continuation of the more technologically sophisticated sectors"; and the awareness that no one southern Africa country was of a critical size on a global economic scale.

To achieve the basic goals of economic growth and reduced dependence on South Africa and other countries, policy objectives included greater utilisation of each state's resources, including hydropower and water as well as an acceleration of work to inventory and evaluate the feasibility of interstate resources, "particularly hydropower/irrigation resources and fertilisers". For this purpose, "specialized aid programmes could be mounted on a regional basis through regional institutions".

The document was very clear about the constraints to the development of hydropower and prescient about the importance of good planning:-

> "Since major dam/hydropower projects are enormously expensive, their economics must be considered carefully. The real value of the foreign exchange, domestic funds, skilled labour and other scarce resources used must be assessed not only against the benefits which could accrue over time were those same resources put to other uses. Such projects need massive markets" …
>
> " … the planning, development and timing of such projects must be integrated with the phasing of power requirements, particularly those of mining/processing/refining chemicals and iron and steel. Too much generating capacity too soon, and too little too late, are very costly. The price of bad planning in southern Africa would be very high. "

Faced with high oil prices "there is a presumption that net additions to generating capacity should be based on non-petroleum sources i.e. hydropower or coal". However, the danger of running too fast into large projects was noted:-

> "This felt urgency could result in nations pursuing the development of major hydroprojects to the exclusion of other alternatives, hydro or coal. The pace of growth of electrical power needs is critical in this context.
>
> "… there are many smaller hydroprojects possibilities, many of them 'run of the river'; the consecutive development of each of these is more consistent with resources available…. Smaller projects are, in general quicker and easier to plan and implement, and can meet incremental power needs on a phased basis."

The document also characterizes those projects which were strictly national (mainly thermal power stations) and those where inter-country cooperation would be required. Given the relatively low electricity consumption in the SADCC countries at the time, together with the high costs of transmission, it was clear that there would be no rapid development of hydropower on a regional basis:-

> "While many electrical power generation investments are strictly national concerns … others have international implications and require multistate co-operation. For these projects, two or more states may be involved with the water resources since major river systems are often international boundaries. Further, portions of more than one country's market may be needed initially, or permanently, to absorb the power from a major project and make it economically sound.
>
> "For the longer term the region should be moving towards an integrated grid. This is not a new concept. Included should be the nations of southern Africa covered by this conference, plus Zaire, which is already integrated with Zambia and given eastern Zaire mining development could profit from an expanded supply from a closer source than Inga (new Kinshasa). In this context of a grid all but the most minor projects cease to be national only and become units in a multinational system. ***The need for political stability and 'trust thy neighbour' becomes very clear under these circumstances***.
>
> "The major hydropower projects calling for multistate co-operation are complex, multipurpose schemes, with power generation as only one of a package of technical and economic possibilities and requirements, including irrigation and settlement, navigation, flood control, fisheries, recreation, tourism.
>
> "***There is need in these cases to plan the technical and financial development of these associated sectors. A significant volume of additional investment may be needed in other sectors to achieve the total benefits needed to justify the basic investment in the dam. Thus, total package planning becomes a matter of multistate planning, even though in some cases not all participating states will be concerned with all sectors***." (emphasis added)

President Seretse Khama of Botswana, in his introduction to "Towards Economic Liberation" raised concerns that remain current when he mentioned water in the context of food security. In order to increase crop production, he identified the need for research, focusing on the challenges of semi-arid areas. Significantly, he acknowledged that there was no agreement at the time for a coordinated action on water:-

> " …. this does not as yet form part of the agreed Programme of Action".

And, providing some context for this, drawing from Botswana's concerns, he noted that

> "A major water source in Botswana is the inland delta of the Okavango River. The Okavango is a regional river rising in Angola and passing through Namibia into Botswana. Its effective use in each of these countries would require that we agree on who can draw how much water at what times of the year."

An important point emphasized by Khama was that there was no contradiction between SADCC membership and involvement in other, more focused and operational groupings. He even identified cooperation in East Africa as a potential model

> Equally, several SADCC states are members', or may become members, of other co-ordination groupings. The most prominent present case is the Kagera Basin Authority which brings together Tanzania, Burundi and Rwanda and which Uganda is likely to join. These States have real common interests in energy, transport and communications, production and trade. They are largely separate from the particular common concerns of the SADCC states but in no way inconsistent with them. Similarly the need for co-ordinated sectoral or regional development may involve Zambia and Angola in co-operating with Zaire in a variety of specific projects.

From SADCC to SADC

South Africa's transition to democracy opened the doors for new cooperation but also required a dramatic realignment of approach from the countries of the SADCC as they moved into the new framework agreed with the establishment of the SADC in 1992. Whereas the strategic economic goal of the SADCC was to reduce dependence on South Africa, the new goal was to build an equitable regional economy which included South Africa.

SADC was also born into a hostile world. The collapse of the Soviet Union and the burdens of 1980s structural adjustment meant that SADC countries had limited scope for autonomous action. In particular, their development agendas were dictated by their western donors. In addition to the general prescripts of the Washington Consensus, the refusal of the west to accept the compromise positions adopted at the Rio Summit on Sustainable Development in 1992 had particular impact in the water sector where the paradigms imposed emphasized environmental protection and constrained resource development (see Muller 2010; Muller 2015).

Nevertheless, SADC attempted to make progress and two of its earliest technical protocols related to water and power. The water protocol (SADC 1995) established the basis for cooperative development of shared rivers while the power protocol (SADC 1996) confirmed that the just-established Southern African Power Pool would provide the basis for development of a regional approach to electricity generation and transmission. Its function was:

> "… co-operation among parties or entities in development, transmission, conveyance and storage of energy in order to obtain optimum reliability of service economy of operation, and equitable sharing of costs and benefits."

It was evident that the water protocol was developed with substantial input from the donor community at a time when they were seeking to emphasise environmental protection and the establishment of supra-national bodies that would reduce national powers with respect to shared rivers. It was substantially revised in 2000 to reconcile it with the more modest and realistic, although still contested, approach of the UN Convention on the Law of the Non-Navigational Uses of

International Watercourses (otherwise known as the Convention on Shared Rivers). It was indicative of the initial focus that, in the revised version, a new principle had to be introduced emphasising the need to ensure that water resource interventions ***"are consistent with the sustainable development of all Watercourse States and observe the objectives of regional integration and harmonisation of their socio-economic policies and plans"*** (SADC 2000) a concern that had been omitted in the first version.

With hindsight, it can be seen how this tension between environment and development bedevilled progress on the water agenda that had been set out by the SADCC in 1980. Perhaps the principal measure of its impact is the dearth of physical infrastructure development in a region with much potential and many pressing needs.

When SADC water cooperation is discussed, the Lesotho Highlands Water Project is always cited as an example of a win-win project in which the benefits of water resource development are shared equitably between the parties concerned. The uncomfortable reality was that the LHWP was, in its initiation, an apartheid project which, while undoubtedly benefitting Lesotho through the construction of power and transport infrastructure in addition to that for water, further strengthened the dependence of Lesotho on its neighbour. It was certainly not an example of how to achieve the SADCC's goals at the time. Nor, incidentally, was the construction of very large dams and the inter-basin transfer of water an example of Europe's preferred approach to water management.

Elsewhere in SADC, progress in cooperative resource development was painfully slow and, because water resource management was seen as a soft sector to which donor funding could be directed, its focus was often on priorities defined by donors rather than the countries themselves. Aside from supporting water supply programmes to meet basic needs, the primary concern of the donors appears to have been to develop approaches that would support resource protection rather than to encourage, let alone support, the development of physical infrastructure.

Thus one of the provisions in the original SADC Water Protocol, removed when the countries recognised that it did not really reflect their needs, was the requirement for the establishment of joint institutions on shared river basins. Their functions were to include the formulation of development strategies and the monitoring water use as well as the execution of integrated water resource development plans in shared watercourse systems. The 2000 revision pragmatically simply provided for countries to establish institutions such as watercourse commissions, water authorities or boards as they saw fit, with their responsibilities to be determined by the nature of their objectives.

On the basis of the provisions of the Protocol, a number of interstate agreements were reached between the countries of the region. Given the desire to present progress on cooperative water management ahead of the 2002 World Summit on Sustainable Development in Johannesburg, Mozambique, Swaziland and South Africa signed what became known as the Interim Incomaputo Treaty[4] regulating the use of one of the most intensively exploited shared rivers in the region.

Shortly afterwards, in 2004 after two decades of preparation, an agreement was signed by seven of the eight Zambezi riparians to establish the Zambezi River Commission. This was the culmination of negotiations that had begun in the 1980s, at the initiative of UNEP, the United Nations Environment Programme, which was seeking opportunities to integrate environmental considerations into water

[4] Its full title is the "Tripartite Interim Agreement between the Republic of Mozambique and the Republic of South Africa and the Kingdom of Swaziland for co-operation on the protection and sustainable utilisation of the water resources of the Incomati and Maputo watercourses"

management. There had been considerable resistance, for a variety of reasons, not least the lack of interest from the countries in the environmental focus on a dramatically under-used water resource (Nakayama 1998).

> "ZACPLAN has not functioned as a powerful locomotive to promote environmentally sound management of the Zambezi river basin with participation of riparian countries, to the extent it was originally supposed to do" (Nakayama 1998).

The 21st century

Despite the revision of the Protocol, the focus on establishing autonomous river basin organisations continued and, with it, the ongoing support for implementation of Dublin-style IWRM. The Zambezi Watercourse Commission (ZAMCOM) was one product of the drive to place the management of shared rivers under regional authority.

Zambia had delayed signing and ratification, arguing that its status as the most important contributor to the Zambezi's flow was not adequately reflected (Zambian Watchdog 2010). 7 years later, an interim ZAMCOM Secretariat was eventually put in place in 2011 and, in 2014, the Permanent Commission was established with its Secretariat in Zimbabwe. Zambia finally ratified in 2013 but only after the responsibility for the decision was taken from the Water Ministry. It was reported that this was done because regional cooperation was a strategic priority for Zambia that overrode sectoral considerations (personal communication, regional official) but it is noteworthy that this occurred after Zambia had completed a number of substantial hydropower and irrigation investments which, even though they were promoted in terms of the SADC Protocol, it perhaps feared might have been contested under a new, activist, ZAMCOM regime.

During this period, although much effort went into institutional issues, some useful water management work was also initiated by the SADC secretariat's water division. A hydrological monitoring initiative was implemented with the World Meteorological Organisation (as a regional pilot for a global observation system), with support from the water sector donors. The SADC HYCOS project established key hydrological measuring stations in shared rivers (SADC-HYCOS 2002) illustrating the kind of specialized role that a regional organization could play in water management.

On the Zambezi, work started by the SADC water division and continued under the interim ZAMCOM Secretariat such as the development of the ZAMWIS information system is still continuing. A range of studies have been conducted, producing an Atlas of the river's environment (SADC/SARDC and others 2012) and a review of development opportunities and constraints on the river (World Bank 2011).

Other river basin agencies have also been created (ORASECOM on the Orange river, OKACOM on the Okavango with LIMCOM still to be formally established on the Limpopo) but, like ZAMCOM, they are small units with limited staff and minimal "own" resources. The ORASECOM has engaged in extensive, donor-funded collection and collation of information as well as IWRM planning exercises – illustrating the tension between hydro-supportive actions to increase knowledge about the basins water resources and hydro-centric approaches to impose conservation norms evident in a Global Environment Facility (GEF) funded Strategic Action Programme (SAP) for the basin.

> "The SAP is a negotiated document that provides a basin-wide framework for the implementation of a prioritised set of national and joint transboundary actions and investments. In the context of the Orange-Senqu River Basin Integrated Water Resources Management (IWRM) Plan, the SAP is specifically focused on addressing priority

> environmental concerns. At national level, the SAP initiatives are integrated into the respective Action Plan of each basin state (ORASECOM 2014)."

However, while the SAP document claims to be integrated into the plans of each member state, the version currently available does not have country endorsement.

Similarly, OKACOM has produced an inventory of the basin's resources as well as a collation of the potential demands on the resource (OKACOM 2014). This incidentally demonstrates that the magnitude of controversial proposals for abstraction by Namibia are small relative to the overall resource availability and unlikely to have a serious impact on the Delta's ecology.

Meanwhile, resource development in shared river basins has proceeded almost entirely on a national basis, aside from continuing bilateral cooperation between Zambia and Zimbabwe on the management of the shared infrastructure of Kariba on the Zambezi, bilateral cooperation between South Africa and Lesotho on the construction of the first phase of the Lesotho Highlands scheme and the preparation for subsequent phases as well as bilateral cooperation on smaller schemes such as the Malawi/Tanzanian Songwe river development project. Very little work had been done to prepare the schemes that had been identified in 1980; one consequence of this was that the potential contribution of regional hydropower was not mobilized to avert the energy crisis of 2007.

One significant success for a new vision of water development as a focus for cooperation between countries was the careful coordination between South Africa and Mozambique in their negotiations with Portugal about the finances of Cahora Bassa. South Africa had no obligation to increase tariffs beyond the levels initially agreed; if Hidrelectrica Cahora Bassa (HCB)'s finances were in deficit that was because it had not provided electricity as per the original agreement. Without a tariff increase, the balance due on the original loans would continue to increase rather than be reduced. So South Africa, acting apparently in concert with Mozambique, was able to ensure that Portugal would not benefit from its ongoing control of the scheme, thereby putting pressure on them to reach agreement with Mozambique.

This was a matter that was dealt with at head of state level. In 2002, President Thabo Mbeki in an address to the Mozambican Parliament stated that:-

> "One of the critical areas of our co-operation is in the energy sector. We will continue our engagements on the best possible options for the full utilization of Cahora Bassa and hopefully ensure that we arrive at an agreement that benefits mainly the people of Mozambique (Mbeki 2002).

There were subsequently regular meetings between Mbeki and Chissano in the framework of the countries' Joint Permanent Commission for Co-operation. South Africa's ongoing engagement was clear, as reflected in the detail included in the Annual Report of its Department of Foreign Affairs which noted that,

> "During a state visit to Portugal in November 2005, President Guebuza entered into a MoU with Portugal after a landmark deal was reached with Portugal allowing Mozambique to acquire majority control of Cahora Bassa …. The total transaction is to be completed by July 2007. The transfer of the HCB's ownership has always been regarded as crucial for the long-term economic development of Mozambique and the Zambezi Valley region in particular" (DFA 2006)

However, the best evidence of concerted action is that, shortly after Portugal agreed to cede control of Cahora Bassa to Mozambique, South Africa agreed to triple the tariff. This then enabled

Mozambique to meet a residual commitment it had made to pay small share (18%) of the outstanding finance relating to its historic portion of the electricity consumption.

Mozambique finally took transfer of ownership at the end of 2007. As the Mozambican News Agency AIM reported (AIM 2007), this was seen a major economic victory, or, as President Guebuza stated it, "The last mark of 500 years of foreign domination in our country has finally been removed".

US$950 million was paid by Mozambique, representing mainly the cost of operating and rehabilitating the dam. What Mozambique did not pay was the huge debt that had accumulated in the long periods that electricity could not be supplied due to sabotage. The Mozambican negotiating position was that since the government of Portugal had originally guaranteed that debt, they had to carry the burden. While that had been a sticking point, South Africa contributed to the pressure by refusing to increase the price paid by its ESKOM for Cahora Bassa electricity. Once the transfer was agreed, the price paid was tripled, as the US Embassy in Maputo reported:

> "The dam's main customer has been South African electricity utility Eskom, and under a 2004 agreement the price the dam holding company (HCB) receives for its exports to Eskom will rise from 5 cents/kwh to 10 cents/kwh in 2006 and 16 cents/kwh in 2007" (USA 2005).

It was an appropriate occasion to note that the dream of tapping the potential of the Zambezi, and using electricity to promote industrialisation, was still alive and well:

> "President Guebuza pointed out that this is the second largest hydroelectric dam in Africa. Cahora Bassa can generate 2,075 megawatts of power, not far short of the 2,100 megawatts of the Aswan dam in Egypt. Transfer of ownership, he said, "will favour an attractive environment for further undertakings to generate electricity for the national grid".
>
> "One example was the planned dam at Mphanda Nkuwa, also on the Zambezi, 70 km downstream from Cahora Bassa. "Our dream is that the day will come soon when we exploit our full potential of more than 12,000 megawatts", declared the President.
>
> "Control over Cahora Bassa, he added, "opens up the possibilities of accelerating our industrialisation. The availability of more electricity will be a strong factor in making investment projects, public and private, national and foreign, viable in our country" (AIM 2007).

Bu despite the documented cooperation and successful outcome, some commentators have decried the South Africa-Mozambique relationship as a new imperialism (Isaacman 2013). And this success has not been matched by progress in the promotion of the other schemes of regional scope that had been identified, in particular the expansion of Cahora Bassa and the construction of Mphanda Nkuwa (or the more recently proposed alternatives, Lupata and Boroma, also on the Zambezi) despite repeated commitments to all of these projects by various parties. A combination of factors have contributed to this failure. The project is complex, involving major water resource developments, transmission line construction as well as agreements on institutional arrangements. Other reasons may include elite contestation within Mozambique, donor and civil society objections on social and environmental grounds and difficulties in negotiating appropriate price and offtake agreements with South Africa's ESKOM power utility (Muller 2014).

However, the failure to exploit this well-defined hydropower potential, described by the World Bank-International Development Association as a project with "significant transformational impact at the regional level" (World Bank 2013), contributed to the power shortages that bedeviled the

region from 2007/8; more broadly, it has seriously weakened trust in the efficacy of regional cooperation. It has also strengthened the determination of member states to prioritise national self-sufficiency over regional optimization of supplies (personal communication, SAPP official). This conclusion echoes the warning given over 25 years previously that “all but the most minor projects cease to be national only and become units in a multinational system. The need for political stability and 'trust thy neighbour' becomes very clear under these circumstances” (Nsekela 1981).

Water and regional integration in Southern Africa

The review of approaches to water resource management in Southern Africa over the past three decades has inevitably already begun to address the specific questions about water and its contribution to regional integration that this study addresses.

In simple terms, from the perspective of water management, the threats posed to regional integration are that the failure to agree to measures to address scarcity or the impact of upstream activities such as pollution, could promote inter-state conflict. The opportunities to support integration are expected to derive primarily from the greater efficiency with which services can be provided to users as a product of shared investments and operations.

So it is important to consider what evidence there is to suggest that there is a significant risk of conflicts as well as to identify areas of opportunity that are impacted upon by current approaches to water development, management and use.

A final set of information that is required to inform discussion about the contribution or otherwise of water to integration is the scale of activities that might be unlocked or constrained by appropriate water management interventions which could in turn impact upon regional integration.

Water resource conflicts in Southern Africa

There is a persistent refrain in the shared waters discourse about the danger that conflicts will arise because of competition over scarce water. Yet there is little evidence to support this. As has already been outlined in the context of Africa more generally, there is not a general shortage of water in Southern Africa. Even in South Africa, where a substantial economy coincides with a relatively limited resource, water use does not reach the intensity of water stressed countries such as Spain and India. The general conclusion that sub-Saharan Africa is economically rather than physically water-scarce applies equally to most of Southern Africa, certainly at a national scale.

This was confirmed in an interview with a senior regional official who for more than a decade has wide oversight over issues that needed to be dealt with by his Ministerial principals. He acknowledged that, in a decade in SADC institutions, the only water-related conflicts he could recall that had reached secretariat level were border-related matters involving rivers.

Such conflicts as have emerged have been over relatively local issues or over problems which are incidental to water management. One example of the latter is a border issue, the case of the Songwe River, which marks the border between Tanzania and Malawi. As described by Shela (2000),

> “The Songwe River experiences severe flooding and meandering in its 30-km very fertile and densely populated flood plain. These floods displace people every year and whenever a piece of land is cut off to the other side of the river the residents change nationality, as per a 1901 border agreement. The two governments reviewed the situation and adopted a plan in 1991, which calls for the joint stabilisation of the river that would involve construction of dams, levees and other accessory works necessary to canalise the flows in the flood plain. The project benefits will also include hydropower, irrigation, tourism, fisheries and environmental management.”

The challenges of navigation from on the Shire- Zambezi route and disputes about environmental protection on the Okavango are two other examples of conflicts that have arisen on shared rivers, in both cases, driven by small groups of national stakeholders (political and transport interests in Malawi, tourism operators in Botswana) who have succeeded in elevating their concerns, with external support.

Malawi's unilateral efforts to open this route, building an inland port and seeking to sail a motorboat from Mozambique to the opening ceremony, attended by three heads of state, was seen as particularly provocative and led to the arrest of a Malawian government official on the boat (AIM 2010). The Mozambican action was however consistent with internal policy since it is developing rail and port links specifically to meet the needs of minerals exporters and needs to achieve economies of scale to make these viable. Guided by these perspectives, Mozambique had also refused to allow multinational company Rio Tinto to use the river to export coal which led to the company abandoning its plans and incurring a US$3 billion loss. So it is perhaps significant that one of the commentaries about the issue was written by a former advisor to Rio Tinto (Chambote 2014).

To some extent, the expectation of conflict may serve to generate it. The reluctance of Zambia to join the ZAMCOM agreement was in part due to the fear that its intended developments might be constrained by objections from other riparians. Yet those fears are not substantiated. Recent studies have shown that only if they develop their water-based agriculture and power to the limits of the potential might there be significant impacts downstream. And, before that occurs, they will already have had to consider tradeoffs between sectors within their boundaries rather than beyond them.

The Okavango provides another example that exaggeration of the dangers may itself provoke conflict. The Okavango is Southern Africa's third largest river, with an average flow comparable to that of the Orange-Senqu which supplies a substantial part of South Africa's people and economy. It is currently almost pristine, with no significant abstractions.

However, when during a severe regional drought in 1996 the Namibian government proposed to abstract a small proportion (0.2%) of the river's flow to meet regional needs in the north east of the country, there was a massive reaction from Botswana and the international environmental community. It was pointed out that the proposed scheme could eventually take up to 6 times more than the initially planned amount (1.2% of the flow). It was warned that the precedent set could be the beginning of the end for the unique wetland (Ramberg 1997).

While the proposal was not implemented, because the drought broke, Namibia is continuing to plan to use Okavango waters. A decade later, a careful review of the river's hydrology and the likely water uses, found that the potential impacts had been significantly exaggerated. The review reported that

> Implementation of all likely potential formal irrigation schemes mentioned in available reports is expected to decrease the annual flow by 2% and the minimum monthly flow by 5% (Andersson et al. 2006).

This review also found that the impact of human use was an order of magnitude than the then-estimated impact of climate change. Nevertheless, contestation continues. Botswana was encouraged to apply to have the Okavango Delta declared a RAMSAR site, to place further obstacles to use of the river's water. The Global Environmental Facility funded a study to value the basin resources which found that not using the water for anything except domestic and ecosystem use gave the best returns at national level; it did this however by assuming that any irrigation would involve a net loss and ignoring any improvements in income distribution that might arise from alternative water uses (Aylward 2009).

Regional perspectives on water use and investment in Southern Africa

If conflicts over shared waters are limited, what of the potential benefits of shared water development? To identify these, it is helpful in starting to disaggregate or disintegrate the various water uses. The object is to consider, for each use, what impact water resource availability and the state of its development and management has on the water users and the extent to which this has

regional dimensions. As previously, this is done through a focus on specific sectors, this time in the context of Southern Africa, with a focus on those sectors whose water utilisation may have significant impacts on shared rivers or other regional issues.

Agriculture

In terms of total water use, the most significant water-consuming sector in SADC is agriculture. However, the extent of irrigated agriculture is relatively limited. It is widely recognized that, as one report succinctly puts it, "The greatest potential for both improved agricultural water management and economic growth in the SADC region lies in irrigating its land". However, there has been limited progress in mobilizing the available water resource for the purpose.

> Despite most water being used in agriculture, FAO 2006 AQUASTAT data show that the total irrigated land of the region (as a proportion of total cultivated area) remains low with 11 of the 15 SADC countries having less than 10% of total cultivated area under irrigation and 5 of these 11 have less than 1% under irrigation. Recent data on irrigation indicate that only 16% of the Region's irrigation potential of more than 20 million hectares is being used, and this is mostly in South Africa and Madagascar. With the exception of these two and Mauritius, the rest of the MS utilise way below half their potential. (Rampa and van Wyk 2014)

As was shown in Table 1, less than 1% of the Zambezi River's water was used for irrigation, according to the UN Food and Agriculture Organisation's Aquastat database. As a consequence, there is unlikely to be competition for water for these purposes over the next few decades although irrigation development in areas above the main hydropower dams will slowly begin to reduce their total potential generating capacity. However, a review of the possible operating arrangements has shown that this impact could be minimized through cooperation between riparians about the scale and location of new irrigation developments (World Bank 2011).

It has been suggested by water managers that the substantial untapped agricultural potential of countries such as Tanzania, Zambia, Zimbabwe and Mozambique might complement the increasingly water-stressed South African agricultural sector and create the basis for more balanced regional trade as well as relieving pressure on water resources (DWA 2010). The trade potential is considered in more detail below.

The flows in the main stems of the region's two largest shared river systems (the Zambezi and Orange-Senqu) are already regulated so the development of irrigation will require investment at local level, to tap the resource, rather than main stream investment to ensure its reliability. Tis suggests that the constraint placed by water on agricultural development is a matter of local agricultural and water resource development rather than interventions at regional level.

Power

If agriculture is the most significant consumptive user of water, power is arguably the most important economic user of water, although it also has a consumptive component, associated with evaporation from large dams.

Hydropower is the major source of electricity for SADC countries, excluding South Africa, accounting for 8 645MW of a total of 14 471 of installed capacity (derived from data collated by Miketa and Merven (2013) for IRENA, the International Renewable Energy Agency). And hydropower has the great advantage of being able to be generated flexibly, to meet changing demand, which means that it is typically more valuable than power from other sources (except perhaps from gas turbines which are equally flexible but have high operating costs).

However, Southern Africa's hydropower capacity is relatively under-developed. Excluding the potential of the Congo River (whose single site at Grand Inga has a greater capacity than the rest of SADC combined), only 33.5% of the region's 27 727 MW capacity has been developed.

> "IRENA's assessment shows that the share of renewable technologies in electricity production in the region could increase from the current level of 10% to as high as 46% in 2030, provided that the cost of these technologies continues to fall and fossil fuel prices continue to rise."
>
> (this) "…. could bring down average generation costs by 9% compared to the case without such promotion. The Grand Inga and associated interconnector projects in Southern African countries would account for five of those nine percentage points of cost reduction" (Miketa and Merven 2013).

IRENA estimates that SADC's current installed hydropower capacity of 9 310MW could be increased five-fold, to 47 967MW, simply by implementing projects already identified in the region. Even if new projects in the DRC were excluded from this, the total could be increased to 27 727 MW. Not only would this increase the availability of electricity from "clean" sources, but it should do so at lower cost than the deployment of other options, hydropower offering the greatest proportion of potential cost savings from the deployment of renewables, once transmission costs are accounted for. By 2030, with an optimal deployment of renewables, hydropower would still be the largest contributor to the renewable component of the region's electricity supply.

Communication

While there is much emphasis in the water resource management discourse on modes of trans-boundary cooperation, the area of transport and communications receives relatively little attention. Yet it is in this area that one of the few recorded inter-state disputes over the use of shared watercourses in Southern Africa has arisen between Malawi and Mozambique (Lalbahadur A 2013). As a land-locked country, Malawi has always aspired to have access to the sea. However, while its right of transit is provided for under the United Nations Convention on the Law of the Sea (UN 1982), these do not give it an automatic right to navigate on another country's "internal waters" without that country's agreement, particularly if those waterways are not used for domestic purposes and alternative transport modes are available.

Malawi's situation is provided for in the Convention which requires coastal states to cooperate with landlocked neighbours but to do so by negotiations. These may include the choice of transport (road, rail and pipeline as well as water) and provide for the states concerned to cooperate in building transport facilities where none exist. There is no automatic right of navigation, particularly if navigation would impose costs (as in dredging for channel maintenance) and risks (for instance, of environmental pollution) on the transit state which could be avoided by using alternative transport modes.

Aside from the Zambezi, only two other navigation issues significantly affect SADC members. The first is the need to rehabilitate navigation infrastructure on the Congo, a key navigation artery for the DRC; this is not primarily a shared watercourse issue although other riparians will also benefit. The other issue is navigation on the Rift Valley lakes and Lake Victoria. The latter is a programme of the East African Community which has made little progress despite significant demand. However, these challenges are not specific to water resource management – although variable lake levels are a second order challenge for navigation – but reflect rather the inability of the states concerned to

cooperate and coordinate their actions to raise finance and then to operate the infrastructure that they establish.

Trade and income distributions

One measure of the contribution of transboundary water management and development to the economic dimension of regional integration is the volume of trade directly related to water from shared rivers. The most obvious examples of this would be in energy and agriculture. A purist approach would consider only the trade in hydropower generated from shared rivers and the trade in produce from irrigated agriculture in the basins of such rivers. While this could be done for hydropower (most of which is generated in shared river systems since they are generally larger with greater power potential) it would be more difficult to do for agriculture.

At present, formally recorded trade in hydroelectricity would appear to be insignificant. The Southern African Power Pool reported that, in the 2012-2013 year, only US$1 042 983 worth of electricity was traded through its market system. However, this does not account for the volume traded under long-term contracts that bypass the SAPP trading system, which is many orders of magnitude larger (Southern African Power Pool – Annual Report 2013). To the extent that these long term contracts reflect investments committed by the client country (primarily South Africa, to fund Cahora Bassa in Mozambique) to generate power, the nature of the "trade" is somewhat different. Using a more general measure, 12% of SADC's energy trade is derived from hydropower (Miketa and Merven 2013).

If the actual short-term trading reflects the lowest aspirations, the highest aspiration are contained in a forecast by IRENA (the International Renewable Energy Association) whose "maximum renewables" forecast suggests that 25% of SADC's 2030 energy requirements could be met from hydropower. Although the value of this would be substantial, there would be a range of alternatives whose value would be of a similar order of magnitude (derived from tables in Miketa and Merven 2013). Trade in hydroelectricity would be expected to increase:

> In absolute terms, total SADC regional generation would increase from 320 Gigawatt-hour (GWh) to 625 GWh by 2030. About 570 GWh would be generated by plants connected to national/regional grid systems, and 17% of the power generated would be traded internationally. This represents a substantial increase from 12% in 2010.

As an order of magnitude estimate, the value of the total grid production, at a cost of US$5c/kwh, would be US$28.5 billion and the traded amount would be worth US$4.85 billion. However, this estimate is based on the deployment of the potential of the Inga scheme in the DRC. "Under the No Inga scenario, the electricity trade volume in 2030 is 67 TWh, 36% lower than the volume under the Renewable Promotion scenario, where the Grand Inga's potential is fully deployed."

These estimates do not take account of decisions by country to pursue local options rather than cooperative projects. Thus IRENA's forecast are based on the assumption that "For Angola, although it is well endowed with hydro resources, these perform poorly in a "dry year" scenario, making imports from the DRC (with the Inga dams close by) a very attractive option." However, Angola is now proceeding to develop its local capacity at the expense of potential imports from DRC which are now directed towards the province of Katanga, Zambia, Zimbabwe and South Africa.

The potential value of traded agricultural production from shared rivers is more difficult to estimate. The CRIDF has attempted to identify trade flows in water related products both in financial terms as well as measured by water volumes (Figure 7) (CRIDF 2014). These do not show a particularly large volume either by value or by volume.

In value terms, SADC's internal agricultural trade was valued at US$ 4.1 billion; external agricultural trade saw exports to the value of US$11.6 billion and imports of US$7.6 billion. This is a small proportion of total inter-SADC trade, (estimated at US$58.5 billion) while SADC's total external trade was reported as US$154 billion (imports) and US$180 billion (exports) (SADC 2014b).

The total value of agricultural exports to countries outside the region is thus 6.4% of the regional total with imports representing just 4.9% of total imports. Internal trade in agricultural products comprises just 7% of the total.

In terms of water, the total volume of "virtual water" traded within SADC was one cubic kilometer of "blue water" (i.e. freshwater resources flowing in rivers, lakes and underground). The total traded externally was exports of 2 cubic kilometres and imports of 3.1 cubic kilometres. This represents just a tiny fraction of the total available "blue water" resources of the region (3 519 km3, 2 500 km3 excluding DRC). These figures show how small a proportion of SADC's water actually flows through trade in water related agricultural production either to between SADC countries or to SADC's external trade partners.

As a cross check, it is useful to consider the agricultural potential of the largest basin in the region. Recent studies of investment opportunities in the Zambezi river basin report that

> "The area currently equipped for irrigation in the ZRB is approximately 183,000 hectares. The average annual irrigated area is around 260,000 hectares. That includes 102,000 hectares of irrigated perennial crops (76 percent sugarcane), representing about 56 percent of the total irrigable area." (World Bank 2011)

It is estimated that the area in the basin that could be brought under irrigation if it was to be actively promoted would be over 2 million hectares. The "gross margin", or value, that could be created from irrigation production on this area is estimated at US$2.6 billion. These figures need to be set against the total GDP of the region which are estimated at US$470 billion in 2010 and projected to reach US$1 800 billion in 2030, at the most optimistic growth rate considered (GDP and trade estimates derived from World Bank Development Report database).

Figure 7: Southern Africa's water related trade flows
(financial, mass and water volume) (CRIDF 2014)

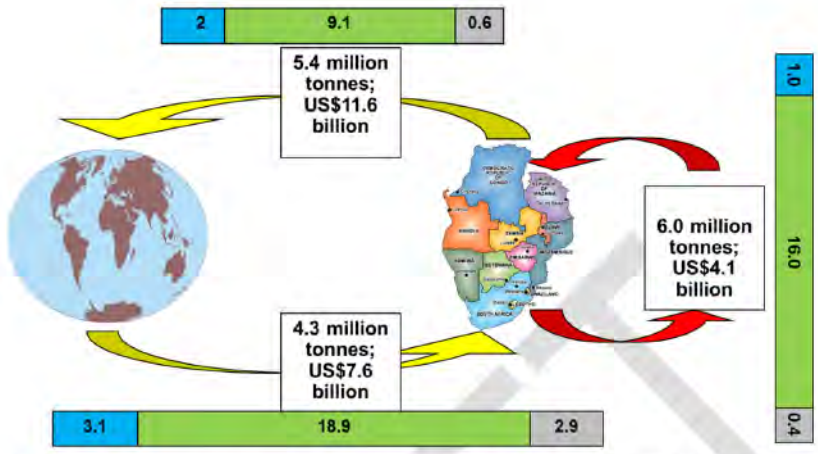


Figure 3.2 The imports and exports of agricultural products (in total) in 2012 amongst the continental SADC countries, and between these and the rest of the world. Tonnages and values are shown in text boxes; the accompanying blue, green and grey virtual water transfers are shown by 'colour' in cubic kilometres

The suggestion that a proportion of regional agricultural production should be shifted from South Africa to take advantage of the more favourable resource endowments in countries such as Mozambique, Zambia and, to a lesser extent, Zimbabwe and Tanzania is technically feasible. If this were done, there would be useful distributional tradeoffs at regional level since in those regions, smaller producers currently account for a larger share of production. The balance of trade between South Africa and the rest of the region would also improve, an important indicator of integration.

However, agricultural economists report that South Africa's capital intensive large farm sector continues to be more competitive than neighbouring producers and that there has been no change in trade trends over the past decade (Vink 2011). However, the evidence is that water availability is not determinant in this process but rather secondary to the development and financing of more effective agricultural and marketing systems. The best that could be said is that the process should not be impeded by water constraints, provided that the finance necessary to develop the resource is available and that production is sufficiently efficient to afford it.

In both energy and power, what the estimates show is that, while trade in water-based production is economically significant and could contribute to better trade balances between Southern African states, it will not be a dominant driver of the regional economy.

Discussion, conclusions and recommendations

Understanding current practice and limited outcomes

What has evolved in Southern Africa are two parallel processes of water resource management, a formal regional process and a set of national processes and *ad hoc* bilateral cooperation. These reflect two competing albeit overlapping paradigms of water management and regional integration. While in some dimensions they can be complementary, there are also significant areas of divergence and their goals are misaligned. The global context in which this occurred has already been described. There are however significant local elements as well.

The formal regional process that was followed in the 1990s was guided by the then-dominant global paradigm and sought to promote a specific approach to IWRM, primarily at a river basin level and was significantly influenced by the negotiations over the UN Convention on Shared Rivers. Its institutional arrangement has, at its apex, the SADC water division, overseen by its Ministers who meet perhaps once a year and a technical committee composed of senior national officials that meet more frequently. The implementation approach adopted was periodically systematized in a Regional Strategic Action Plan (RSAP).

In parallel with these processes, all SADC countries have continued with their own national programmes of water resource development and management, cooperating with their neighbours where appropriate on a bilateral basis. While in many countries the priority has been to meet the basic water supply and sanitation needs of their populations, the management of water resources has also been addressed to a greater and lesser extent, both for human needs as well as for irrigation and power generation. But this is always constrained by the limited financial resources available to them.

The divergence between the two approaches has been particularly acute in three areas:- infrastructure development, institutional organization for water resource management and the role expected of regional institutions. Each of these will be considered in turn and the outcomes assessed in terms of their impact on the wider community rather than in terms of the self-referencing objectives, which have characterized the dominant approach. Finally, a reflection on the impact of the region's extensive dependence on donor support over the past few decades is relevant>

Infrastructure

The formal SADC approach initially reflected the dominant global paradigm which focused on environmental conservation and protection; using measures which, in the language of Europe's Water Framework directive (European Commission 2000),

> "… prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;
> (b) promotes sustainable water use based on a long-term protection of available water resources;
> (c) aims at enhanced protection and improvement of the aquatic environment."

Thus the 1995 version of the SADC Protocol south to give to the proposed river basin institutions responsibility to harmonise national legislation and then to promote:-

> "… measures for the protection of the environment and the prevention of all forms of environmental degradation arising from the utilisation of the resources of the shared watercourse systems."

This would have facilitated action by external parties to impose global norms on the region, through basin institutions which reported to SADC rather than to national governments. The revised 2000 version still places heavy obligations on governments, requiring them to

> "… individually and, where appropriate, in cooperation with other States, take all measures with respect to a shared watercourse that are necessary to protect and preserve the aquatic environment, including estuaries, taking into account generally accepted international rules and standards."

What is not generally recognized is that this formulation makes it possible to use standards developed in other regions as "benchmarks" against which to assess local approaches. There is evidence that some parties seek to use the UNECE Convention on Protection and Use of Transboundary Waters in this manner.

Such goals may be appropriate in a continent where the resource development necessary to support social and economic activities has been underway for centuries and has arguably reached maturity. They are patently inappropriate in circumstances where the only way to achieve acceptable levels of water security for human development in societies with rapidly growing economies and populations will be to modify the natural resource though the construction of infrastructure.

As a result, at the request of its member states, SADC also began to emphasize water resource development (the 2005 SADC water policy explicitly stating in a footnote that, while IWRM includes "the developmental aspects of water …. as a way of emphasising the importance of development in the SADC region, the word "development" is also used together with the word "management") (SADC 2005a).

Privately, both SADC and national government officials acknowledge that the inclusion of infrastructure has been contested, particularly by some donors as being a deviation from ***IWRM***, which had become the code word for the core donor agenda, just as "***and development***" reflected the emerging domestic alternative. One formal meeting in Europe between African Ministers and an important bilateral counterpart broke down when the Africans insisted that infrastructure be included on the agenda and their European counterpart refused (one author participated in this meeting).

The consequence of this tension was that there was minimal focus on infrastructure in the RSAPs, which were, effectively, the agenda for donor support to the SADC water sector. The first RSAP (SADC 1997) contained only three infrastructure development projects, all focused around Lake Malawi (the control of the Lake and its outflow, the Shire River, the navigability of the Shire and Zambezi and the stabilization and development of a Zambezi tributary, the Songwe river, which flows into Lake Malawi).

The RSAP 2 (SADC 2005b) emphasised the need to move to a greater focus on infrastructure, drawing heavily from other sectors of SADC to illustrate the needs. It noted, for example, that

> Water is a source of hydro-electric power and if harnessed can enhance energy security in the region. This is important because it is anticipated that by the year 2007 the region will run out of generation surplus capacity if no new generation projects are put in place. The Southern African Power Pool (SAPP) has collated information about the short-term generation projects that coincides with the period of this Strategic Plan. The RSAP, through the Regional Strategic Water Infrastructure Programme, should explore ways of linking up with the SAPP effort by investigating other uses that will lower the investment costs as well as bring other social benefits e.g. provision of infrastructure for irrigation."

Despite this carefully contextualized affirmation of the importance of addressing infrastructure development, no specific water resource infrastructure projects were included in the RSAP 2 and only US$120 000 was requested for "infrastructure development support" in a compendium of proposals whose value exceeded US$50 million. It was only in 2010 that it was acknowledged that infrastructure should be a central pillar of the RSAP (SADC 2010). Nonetheless, the RSAP 3 continued to omit projects involving the development of water resource infrastructure, (save for the Kunene Water Supply Project between Angola and Namibia which was essentially a services rather than a resource project). It committed only to identify, prepare and package selected regional, cross border and national projects on the basis of their contribution to the goals of peace and stability, integration and poverty eradication, using water as a catalyst. These were to be promoted "in various ways including through the organisation of investment conferences".

Finally, a portfolio of investment projects (SADC 2011) was presented to a poorly attended donors' conference in Lesotho.

> **"**Very few investors were present (Standard Bank and an AfDB based infrastructure fund) and only a few donor partners. This was largely due to the approach taken in the preparation of the conference which had not clearly identified the types of funding that were required for the wide variety of projects presented. These ranged from resource monitoring (a public finance/ODA type of activity) to well-known initiatives such as Inga 3 (for which funding is being negotiated in other processes). Some interesting newer projects were tabled (e.g. Batoka HE on the Zambesi)" (Private report of meeting)

If Southern Africa's water resource development had been conditional on the progress of the regional water resource agenda, the region would have entered the second decade of the 21st century in a parlous state. Fortunately, this was not the case. Within their limited means, often with support from outside the water sector, all SADC countries engaged in a wide range of water resource development and management activities that they required to meet their immediate development needs.

Between 2000 and 2014, Angola initiated programmes to develop its hydropower potential to meet the country' growing electricity demand; Botswana is pressing ahead urgently with the North South Carrier as a drought demonstrates why infrastructure is needed for water security; South Africa and Lesotho having completed Phase 1B of the Lesotho Highlands Water Project have begun preliminary work to consider Phase 2; Swaziland completed the Lower Usutu Irrigation Project, made possible by the tripartite agreement with South Africa and Mozambique over the utilization of the Komati and Maputo rivers; Zimbabwe and Zambia continue to cooperate both on the management and maintenance of the Kariba Dam as well as on possible future joint developments while Zambia has made substantial progress to develop its hydropower resources on the Zambezi, in part to meet the demand of the mining sectors.

All of these actions, on shared rivers, fell outside the purview of the RSAPs and indeed, were not supported by them; it could be argued that the RSAP programmes actually detracted from more urgent priorities, as illustrated by Botswana's difficulties in providing reliable supplies to its eastern urban corridor (Mmegi 2014). A compromise between the constrained approach of the SADC water sector and the organization as a whole was addressed when the 2011 SADC investment plan (SADC 2011) collated the many ongoing projects that had been initiated or proposed outside the formal SADC water sector framework:-

> "The Water Chapter identified some 34 water infrastructure projects that are ready for immediate implementation between 2013 and 2021, given the preparation that has already been undertaken, with an estimated cost of US$16 billion. In terms of impact, the projects shall address and facilitate the increase of:
>
> • Annual renewable water resources storage from 14% to 25%;
> • The area under irrigation from 3.4 million hectares to 10 million hectares (i.e. by 13% of the potential);
> • Hydropower generation from 12 GW to 75 GW (i.e. an increase from 8% to 50% of potential);
> • Access to water supply from 61% of the population to 75% of the population; and
> • Access to sanitation services from 39% to 75% of the population. (SADC 2012b).

What was significant is that the majority of these proposals had not been included in the RSAPs.

Institutions for water management in shared rivers

In the realm of institutions, as has already been documented, there are significant differences in approach between the SADC regional approach and approaches at national level. There are indications, however, that the differences have been reduced by virtue of a changing definition of the initially intended regional approach.

SADC's formal approach to water resource management repeatedly emphasizes the importance of regional integration. It uses this focus as the basis for the water resource management approaches that it promotes, which in turn have reflected its donors' agendas. RSAP-2 is quite specific in this regard.

> "The SADC region has 15 major river basins, which are transboundary. SADC has long recognised the tremendous opportunities for cooperation in managing the shared resources for regional economic development and integration. This underlines the importance of strengthening River Basin Organisations." (SADC 2005b)

While the formal SADC approach was initially focused on the establishment of river basin organisations with operational powers and functions, it is becoming evident that this ambition has been tempered and that the intended scope of the RBOs will be limited. Given dependence on external support, it is not surprising to find that concerns about the river basin model were raised most sharply by external parties rather than in the countries themselves. Swatuk (2005) reported that:

> "In his opening address to the 5th Annual Meeting of WATERNET, van der Zaag (2004) suggested that perhaps the creation of wholly new institutions for water resources management was a mistake. Rather, the new institutions might be more effective if they were endowed with advisory powers only, and that more effort should be made to introduce IWRM practices to existing bureaucratic forms and procedures. This is a bold statement. In my view it shows a degree of reflexivity not yet evident among the balance of the SADC water community. We would do well to reflect on his words, for institutional change challenges political power and so may account for the broadly negative experience with the new water architecture in SADC states."

However, if the RBO agenda was not formally challenged in words, it was clearly challenged by practice. Across the region, a far more pragmatic approach is evident in the actions taken by national governments in the area of water resource development and management interventions, which

have often run contrary to the approaches adopted in their parallel involvement with the formal RBOs promoted by SADC.

Thus on the Zambezi, Zambia and Zimbabwe are cooperating on the ZRA as well as on the preparation of the Batoka Gorge scheme; Malawi and Tanzania are developing the Songwe scheme; but the ZAMCOM has not been involved. The conflict between Malawi and Mozambique over Zambezi navigation has been dealt with bilaterally rather than through the agency of the nascent ZAMCOM or the SADC water sector.

On the Orange-Senqu, the Lesotho Highlands Water Project is proceeding under the guidance of a bilateral Joint Commission. ORASECOM has no role, save for providing an additional communication channel between some of the many parties affected. Even on the Okavango, it would appear that Namibia has simply used the data collection exercises undertaken by OKACOM to support and reinforce its pre-OKACOM proposals with which it is now proceeding.

In interviews conducted with officials of four of the major Southern African river basin organisations, they confirmed that they were unlikely to achieve the initial aspirations of their funders and be given delegated powers and functions to undertake resource management functions. At best, they would provide a communications channel and a shared source of technical information that could form the basis for interactions between the states concerned. They could also play a useful role in public education through the engagement of interested stakeholders in their events.

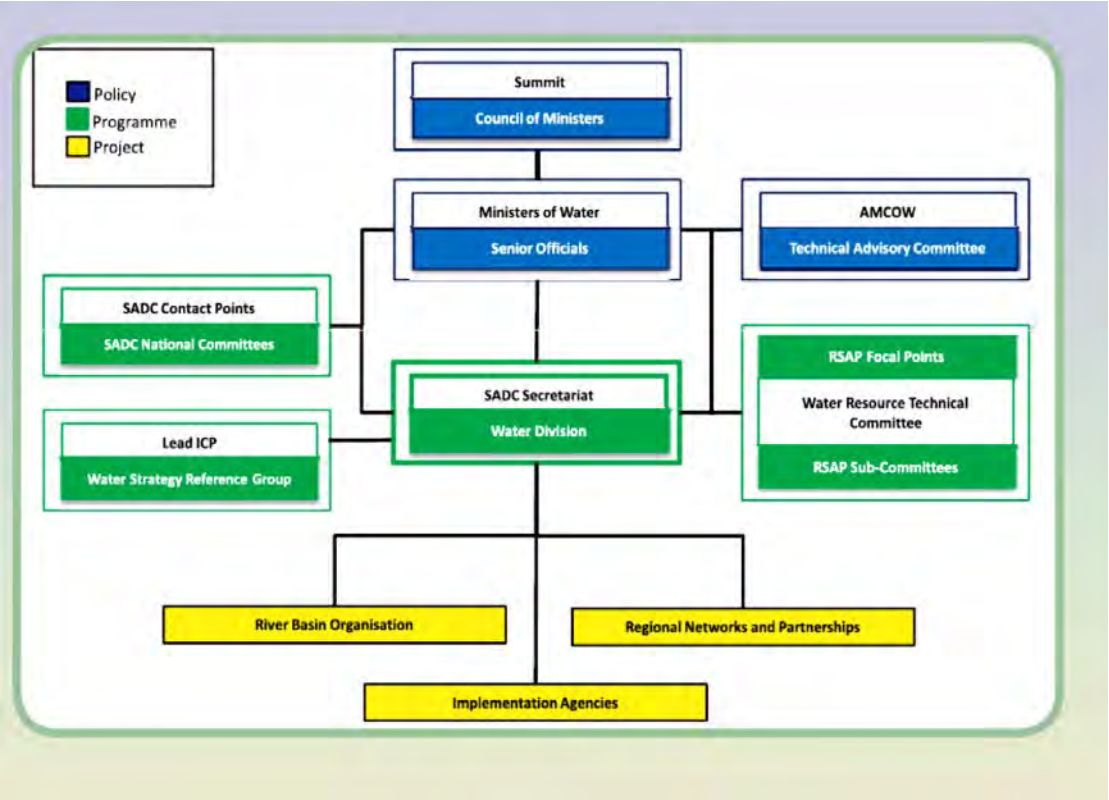
The contribution of data collection to the preparation of proposals for resource development on the Okavango illustrates one of the more useful roles that regional water institutions can play, and indeed one that is necessarily focused at the river basin level. Hydrological information makes a significant contribution to the effective planning and development of water resources. It is a vital public good that has to be collected over long periods of time with no immediate payback; as a result, publicly funded institutions are needed to collect and maintain the information.

In this regard, a potentially useful SADC initiative was the joint action on hydrological monitoring that was implemented by the World Meteorological Organisation (as a regional pilot for a global observation system), with support from the water sector donors. The SADC HYCOS project, which established key hydrological measuring stations in shared rivers (SADC-HYCOS 2002), was executed in two phases. One of the challenges was to ensure that national water resource institutions had the capability to sustain their operation which was not always the case. The ability of national water management institutions to use the data for applications which bring tangible benefits to local communities, such as flood forecasting, is also reported to be limited (WMO 2011) although other initiatives are building the tools to make this possible.

Role of the Regional Economic Community Institutions

If river basin organisations have a limited role and most inter-state treaties and agreements simply provide for *ad hoc* cooperation between national agencies to address specific issues (the dominant mode of cooperation), what then will be the role of the overall regional institution? The SADC secretariat's view is illustrated in the RSAP 3 which provides the following architecture:

Figure 8: Institutional framework of the SADC water sector



(SADC 2012)

What is notable in this model are the limited opportunities for interface with agencies in other sectors. Interactions with water users and other interested parties are limited and occur primarily in the river basin organisations or through the channel of SADC national contact points. The model assumes that water resource planning happens primarily at river basin level (although, as discussed above, river basins are not a logical geographical scope within which to plan with other sectors or in situations of scarcity when interconnections become important).

Political discussions about sector issues are supposed to happen at Council of Ministers level, but there is little indication of how inter-sectoral proposals are developed and discussed before the Council's short annual meeting. There is also no indication of how functions which could be undertaken at a regional level – particularly in relation to the production, collation, analysis and dissemination of water-related information – are addressed.

The consequences of this approach are evident in the outcomes (or absence of them) in the power sector and it is from this sector that the need for alternative models for regional engagement emerges most clearly.

The lack of progress on the development of Mozambique's hydropower potential would appear to be the result, in part, of a failure to negotiate an appropriate set of arrangements to use the evident potential in ways that would equitably share the benefits. This is first and foremost a water project but it cannot be addressed solely at river basin level. While complementary water uses can be identified (critical amongst these would normally be flood management and agriculture) and confirmation will be needed that that there is no objection to the proposed development from other riparian states, the determinants of project viability lie elsewhere.

As explained in the Mphanda Nkuwa Project Brief (SADC 2013b) part of the project's output would go to Mozambique and the rest to the region. The project would provide an "anchor load" for the proposed new transmission line that Mozambique wants to build to link the centre and north of the country – at present, Maputo is supplied via South Africa since there is no direct high capacity line. For this project to be feasible, there would have to be agreement with power users both to provide sufficient financial guarantees to provide assurance to the financiers of the hydropower generation but also to those who would finance the transmission line through which some of the power would be "wheeled" to external users. This requires the agreement – and demonstrated capability to perform – of an external purchaser such as ESKOM as well as the internal client Electricidade de Mozambique (EDM) for both the internally consumed portion of the energy produced but also for the viability of the transmission line. To the extent that (separate) private companies are taking the lead in both the generation and transmission, their performance is also critical.

This requires a complex set of binding agreements which it has apparently not been possible to conclude. Although this is perhaps more complex than the typical power project, it illustrates an area in which inter-sectoral support would arguably have been the most important contribution that SADC could have made. A further benefit to external inter-sectoral support and oversight is that it also becomes possible to introduce the opportunities and constraints represented by navigation, irrigation, disaster mitigation and environmental protection, all of which tend to be relegated to a lower priority when the process is led by the power sector alone.

Unfortunately, the structure of the regional organization in both energy and water (as too with agriculture, environment and disaster management) reflects the national silos and the inter-sectoral nature – and potential – of development has been lost. So where the regional institution could play its most valuable role – in coordinating the actions of diverse sectors – it has been largely absent. The sectoral structures, controlled as they are by sectoral Councils of Ministers, simply replicate domestic silos. This is aggravated by the sectoral focus of donors on whom much of SADC's activities depend.

The challenges of donor relations

When SADCC was established, there was already apprehension about the challenges of implementing an effective regional strategy. As already mentioned, these included the "humiliating process of seeking and receiving external multilateral and bilateral aid which then often appears to serve the objectives of the donor more directly than the recipient" as well as the "the psychologically uncomfortable awareness that the skilled expatriate remains central to the evolution and continuation of the more technologically sophisticated sectors" (Nsekela 1981).

That foreboding was well founded and there were significant tensions between the SADC water sector and its key donors over the next three decades, although these were carefully, and almost always diplomatically, managed. One reflection of these was to be found in the drafting of the SADC Water Protocol. There is ample evidence from participants to suggest that the drafting of the SADC Protocol was used (and to some extent abused) as part of the negotiating process around the UN Convention (Nakayama 1998). Observing from the World Bank, Salman (2007) considered the two processes to have been linked:

> "The 14 Southern African Development Community (SADC) member countries revised their 1995 Protocol on Shared Watercourse Systems in 2000 to make it consistent with the provisions of the Convention."

This meant that, as well as the concerns of the Member States, the revisions of 2000 to the SADC Protocol also reflected the outcomes of negotiations over the UN Convention. Stephen McCaffrey

(Special Rapporteur on the Law of the Non-Navigational Uses of International Watercourses, 1985-1991) commented that

> "…. a number of proposals were made during the UN negotiations for strengthening and, it was said, updating the provisions of the Convention from an environmental standpoint. Most of these proposals came from Western European delegations but a few came from other regions, such as Latin America. Very few of these proposals were ultimately accepted." (McCaffrey S 2001)

Similarly, the changes in the institutional provisions reflected resistance to European proposals. As McCaffrey recalls, some parties also wanted to prescribe the formation of "joint commissions" (as was done in the original SADC Protocol) but this did not succeed because

> "….some states – and indeed some members of the Commission – were somewhat uncomfortable with even the article as it presently stands, let alone a more specific provision."

Some of the changes in the SADC Protocol thus reflected the more considered view of the majority of UN members rather than the priorities of the Europeans who had supported the drafting of the SADC Protocol. They also reflected more closely the emerging consensus in Europe, where attempts by environmental groups to promote the establishment of transboundary institutions as part of Europe's Water Framework Directive were eventually rebuffed.

The tensions surfaced in particular over the role of infrastructure. This was hinted at in the 2005 review of the RSAP (SADC 2005b), which noted that:-

> "SADC is part of the international community. Consequently water-related developments at the international level inevitably influence the SADC water agenda. The following have been significant:
>
> - The second and third World Water Forum held in March 2000 and 2003 respectively helped to define development and management of water resources within the IWRM paradigm in line with Dublin principles. An important feature of World Water Forum meetings has been agreements by participating countries to implement specific targets and objectives, not only to improve the status of water resources, ***but also to ensure that the resource is optimally utilised to the benefit of human kind (e.g. for attainment of the Millennium Development Goals).***" (emphasis added)

Another significant nuance could be detected in a SADC presentation in 2005 to an international meeting where SADC official Luis Almeida pointedly referred in his presentation to IWRDM (integrated water resources development and management) rather than the traditional IWRM. He went on to list as priorities to "retain process ownership and leadership with the Zambezi riparian states; to finalize the strategy development process while addressing immediate priorities targeted at poverty reduction; and the preparation of the strategic infrastructure investments" (Almeida 2004).

Other commentators, from outside the secretariat, have been more explicit. As Swatuk summarized:

> "Southern African states are undertaking comprehensive water sector reforms. While motives for reform are partially local, they are in large part driven by the interests and ideologies of Western states and civil societies…. to achieve sustainable, equitable and efficient water use in the Southern African region, it is important to reflect on the political

> nature of these activities and to reconsider (and be prepared to revise or discard) the basic assumptions and ideologies driving the reform process." (Swatuk 2005)

The extent to which the SADC programme has been dominated by external donors rather than internal priorities is reflected in other reviews even where these are generally positive:

> "RSAP-IWRM has been praised by experts in the field as "a unique experiment in international cooperation directed at achieving an integrated approach to water-use development and management, crossing national borders and river basin boundaries. It is the most advanced and comprehensive multi-country freshwater programme in the world and it has no parallel on this scale anywhere else in the world." (Halcro-Johnston et al. 2004) However, because RSAP-IWRM projects are mainly funded by donors, its success largely depends on donor commitment and the changing agenda and priorities set by the international donor community. "This fact, more than any other, has impeded the ability of SADC to implement a well-coordinated and integrated programme towards achieving the original goals of RSAP-IWRM." (Boege and Turner 2006)

And those voices have grown louder:

"IWRM may have resulted in an unwarranted policy focus on managing and integrating the use of limited water resources instead of investing in the development of water infrastructure and enlarging access to the resource" (Mehta et al. 2014).It is thus reasonable to conclude that, just as the approach to broader regional integration in Southern Africa reflected a rather technocratic European textbook approach that was in keeping with the political climate of the time, SADC's approach to water resource management has been significantly influenced by global political dynamics around environment and development.

Failure of implementation or of conception?

"No wonder water is high on the SADC agenda" said the 2005 RSAP, once more expressing the long-standing formal belief in water's potential contribution to the region and its integration (SADC 2005b).

Yet little evidence has been found to support this belief. This cannot simply be due to a failure to operationalize the intent. After all, the SADC Water Protocol was the first technical instrument to be agreed by the new SADC. Perhaps this did not reflect the high priority of water for the region's Member States? Issues of transport, telecommunications and energy were already much higher on the agenda. Perhaps there had not been enough preparation by the Lesotho-based water sector coordinating unit before SADC's operations transferred to Gaborone? Certainly, more extensive work had been done in the other priority sectors.

A more likely explanation for rapid quick start is that, precisely because water matters were of more limited concern and did NOT involve competition between alternative projects or policies, water offered SADC a "quick win" which did not require substantial political decision-making or compromise. The water-related political decisions of the time were in the main focused on specific projects whose issues were being resolved in a project specific manner rather than requiring a region-wide approach. This was in contrast to, for instance, the electricity sector in which the establishment of a regional power pool that would provide the basis for a regional electricity market was a far more substantive intervention that required significant technical analysis and political engagement.

The fact that SADC was also responding to the external pressures which drove the Water Protocol was perhaps also a diversion. Engaging in global negotiations to draft a UN Convention on Shared Rivers, even if only as a regional case study for the international parties to lobby for and "test-drive" their preferred approaches was not the best way to determine an operational agenda. But because the parties concerned were, in many cases, also SADC's donor partners and were channeling their support to undertake this work, it was difficult to refuse. (It has been suggested that the Protocol was in fact an output of work sponsored by UNEP on the Zambezi Action Plan, which was in turn an effort to promote environmental priorities to generally unreceptive African governments (Nakayama 1998). But this might be one of the reasons that it took so long to reach agreement on the Zambezi!)

Yet there was a more fundamental reason for the limited operationalization of a directed SADC programme that could produce concrete outcomes. It was hinted at in the 2006 SADC Regional Water Policy, which included as one if its strategies, to:-

> Identify water infrastructure projects that have regional significance and hence develop and implement a regional strategic water infrastructure programme to change the lives of the regions' people and meet the MDGs.

This definition may unintentionally have highlighted one of the reasons for the limited engagement of SADC in water infrastructure development. One of the conclusions of the present study is that there are few projects of regional significance that are not already being dealt with in practical, if *ad hoc* manners, by the SADC member states concerned. As a result, there are not many situations in which a SADC (or river basin organization) intervention in water development could have had a direct regional significance!

Limited outcomes and many ongoing challenges

> " …. these experiences have proved both Nyerere and Nkrumah right. Nkrumah's dictum, „Seek ye first political unity and the economic union shall be added thereunto", held true then and holds true now. Nkrumah's fear that a delay in political unity would expose individual African states to neo-colonialist manipulations and Nyerere's fear that sovereignty, flags and state power would be too sweet to surrender, have all come to pass, and tragically so." (Shivji 2008)

Some of the phenomena observed when regional cooperation collapsed following the breakup of the former Soviet Union are still playing out in Southern Africa where the dissolution of colonial unions such as the Central African Federation of Rhodesia and Nyasaland and the ending of political alliances such as that between South Africa and Portugal in respect of the latter's African territories interrupted some cooperative projects. Thus, until recently, cooperation between Zambia and other Zambezi riparian states through ZAMCOM was constrained. Similarly, there has been a failure to reach agreement between South Africa and Mozambique to promote the expansion of hydropower generation on the lower Zambezi, contrary to the experience of Portuguese cooperation with *apartheid* South Africa three decades earlier.

The contrast between colonial cooperation and SADC's slow regional progress is striking. It suggests that the challenges in the water sector are perhaps underlain by a broader set of political dynamics. One issue may be the failure to establish a stable set of regional political relationships through which regional projects in individual sectors can be promoted. Another is the pervasive influence of external actors due to the reliance of the sector on financial assistance.

Although much has been claimed in terms of institutional development, cooperation and capacity development, there have not been many concrete development outcomes that meet the aspirations

of advocates of water's contribution to regional development and integration and very few that can be attributed to SADC's RSAPs.

Many of the positive outcomes have already been mentioned. They include the ongoing cooperation between Zimbabwe and Zambia on Kariba dam and related projects; the Lesotho Highlands Water Project, the LUSIP Project in Swaziland, Malawi and Tanzania's joint Songwe River irrigation/hydropower project; as well as developments by Angola and Namibia on the Cunene River. Zambia has also proceeded to develop some of its hydropower capacity in the Zambezi (before signing up to the ZAMCOM agreement). The SADC-HYCOS project and some of the information products produced by the River Basin Organisations are also useful contributions both to national governments and their stakeholders seeking to understand better the potential of and constraints to their use their resource.

The positive outcomes have to be weighed against significant water resource management failures. Although responsibility for these lies primarily with the national governments concerned, the fact that they occurred is indicative of the limitations of the SADC water sector's contribution.

Perhaps the most obvious has been the failure to bring regional hydropower projects to implementation at a time when the region's power supply was under huge stress. This represented a significant failure both to meet regional development needs but also to promote related sector water management objectives. This failure has had impacts well beyond the water sector. A senior regional official in the energy sector (personal communication) has stated that the failure of regional cooperation to produce the generating capacity when required has set cooperation back by a generation, that all countries are now seeking self-sufficiency and will only begin to cooperate through the SAPP trading system once their "sovereign" capacity is in place.

Another more local failure has been the unresolved dispute between Mozambique and Malawi over navigation on the Zambezi. Again, this has undermined confidence in water cooperation and aggravated regional conflicts, reflecting ineffective engagement although the issues were well known.

More systematically, there is little prospect of achieving by 2021 the goals set out recently in SADC's Regional Infrastructure Development Master Plan (SADC 2012):

- Annual renewable water resources storage from 14% to 25%;
- The area under irrigation from 3.4 million hectares to 10 million hectares (i.e. by 13% of the potential);
- Hydropower generation from 12 GW to 75 GW (i.e. an increase from 8% to 50% of potential).

There is certainly no plan at SADC level to achieve these regional goals.

Water's indirect, "2nd order", contribution to Southern African integration

The limited role that water related production plays in regional trade is repeated in the relatively limited proposals for the further development of ***regional*** water resource infrastructure. This is demonstrated by the low financial allocation sought for the sector in the RIDMP (regional infrastructure development master plan (SADC 2012). This proposes only US$16 billion for water projects identified for implementation between 2013 and 2021. This represents only around 3% of the USD428-558 billion required for the implementation of all the RIDMP projects with the power accounting for 68%, transport 23% and ICT 5%. Even within this, a significant proportion of the water investment is directed towards dam projects whose primary purpose will be power generation.

Table 2: Financial requirements for regional infrastructure programmes

Sector	Program Description	Initial Investment Cost (US$ million – US$ billion)
Energy	Energy generation and grid connections	290.00 – 420.00
Transport	Construction and maintenance	100.00 – 100.00
ICT	Complete broadband connectivity	21.40 – 21.40
Meteorology	Improved equipment, manpower and expertise	0.19 – 0.19
Water	Investment projects and studies	15.41 – 15.41
Tourism (TFCAs)	TFCA facilities investment plans	1.10 – 1.10
Total		**428.10 – 558.10**

However, this low level of investment belies the ambitious goals that have been set for water management set out in the summary of the RIDMP, referenced above. Recognition of the limited engagement is already evident in the choice of words, suggesting only that "***the projects shall address and facilitate"*** the achievement of the region's objectives ***(emphasis added).*** The underlying assumption appears to be that these goals will be achieved primarily through national rather than regional investments.

So these figures alone cannot be taken to indicate that water resource development is not a high priority for regional integration. As already noted in the introductory analysis, much of the expenditure on regional projects is for connecting infrastructure; this connection function is already provided naturally by rivers and lakes. The importance of water investment lies in the uses to which the region's water resources are put – and this is where its potential contribution to agriculture and power as well as to urban development and social needs becomes obvious. Water's contribution is thus primarily a second order one; it enables other economic activities that, together, may contribute to regional integration.

Stakeholder perspectives

The limited regional dimension of water management was confirmed by stakeholders, or rather by their absence. During the research, a concerted effort was made to engage with stakeholders from water user sectors as well as related areas such as environmental management to determine their views on the contribution of water resources and their management to regional integration. Stakeholders engaged included those from agriculture and energy sectors as well as the development finance and environmental management and advocacy sectors. A range of water sector stakeholders were also consulted to obtain their insights.

Many of the responses were clearly conditioned by the conventional wisdom. From a development finance perspective it was stated that

> "The RBOs have been established to realise the benefits of sharing and managing water resources equitably and for the establishment of joint infrastructure such as Cunene and LHWP"

although these projects have been implemented outside the RBO framework.

In agriculture, notwithstanding the emphasis placed in regional programs on cooperation as well as on water development, there was no specific interest from regional organisations in matters of regional cooperation for water resource development in support of agricultural development while

national organisations simply confirmed that it was important that disagreement about the use of shared rivers should not impact on their ability to use water. The assumption was that water interventions would be addressing local needs and would be driven at a national level. And there was no evidence that this was seen as a contribution to regional integration. As one national agricultural official put it, "regional economic integration is a desirable goal and will provide improved opportunities for all farmers".

One respondent did specifically cite the absence of greater regional cooperation and harmonization as an obstacle to potential integration. This was in the bio-energy sector where, it was pointed out (Fechter 2011) that Southern Africa's natural resources were considerably more extensive than those of the Brazilian *cerrado*, the zone in which Brazil has developed a successful bio-energy complex combining sugar, ethanol and electricity production (Cerqueira Leite et al. 2009). However, unless the regulatory framework in electricity, liquid fuels and sugar production was harmonised at regional level, it would be impossible to mobilise this potential it was suggested.

Still in the energy sector, there is great interest in regional cooperation both from South Africa, which is still the major market for new generation, as well as from other countries who seek to achieve scale, trade benefits as well as supply security by expanding production. There had been a conviction that cooperation would be good for the region. However efforts to achieve greater cooperation have not borne fruit and had not been supported by effective action at regional level. Thus SAPP warnings about the dangers of power shortages had not triggered effective responses. With respect to the development of cooperation to mobilise hydropower potential, this had been frustrating and it had not been possible to achieve agreement between national parties.

One consequence of these failures has been that an energy supply crisis emerged in 2008 that saw widespread power cuts in South Africa, but also in countries that had hitherto relied on South Africa supplies. This was particularly acute in countries where there were no formal agreements covering all the energy imports since these additional non-contractual exports were particularly vulnerable to restrictions during supply shortages. Rather than support regional integration, these experiences have had the reverse impact, leading many countries in the region to question its benefits and instead to promote alternatives aimed at achieving national supply security.

Some stakeholders with a direct interest in regional integration did consider that water was an important contributor. However, their perspectives were invariably informed by the notions of regional scarcity and the danger of conflicts between riparians as well as the need for regional cooperation in infrastructure development to address these issues. There was little evidence of an engagement with the issues but rather of a repetition of the sector's narrative.

Some officials were however insistent that water matters could contribute to regional integration if only because they offered demonstrations of cooperation although it was acknowledged that this effective cooperation might reflect the fact that there were limited underlying challenges.

This perspective was emphasized by serving SADC officials, as already recorded. Regional integration would be supported simply by practical examples that showed the value of integration, it was stated, rather than by the development of top down institutions:

> "The challenge for SADC is to demonstrate the value that it brings. If people see no benefit, they won't make it work. Many People and countries don't see the benefits. For this reason, there is a need to distinguish between a top down and a bottom up "functional" approach. Of course there is a need for political will and support but visibly functional integration is critical" (interview with senior SADC official).

Perhaps the most telling conclusion came from regional integration practitioners themselves. When pressed to develop measures of progress on integration, water resources are not seen as a critical measure of or instrument for promoting regional integration. This was illustrated by the approach of the proposed African Regional Integration Index (ECA/AU 2014) does not mention water in any of its 53 dimensions (of which 10 are to do with infrastructure) and makes only brief mention of joint action to address cross-border challenges such as water management (Bassole 2014).

Water, a *driver* of regional integration?

It is noted in the introduction to this report that the research questions posed in the initial call for proposals started from the widely held assumption that water was a driver of regional economic integration and resulting socio-economic development. But caution was expressed. It was also suggested that water might be a constraint to regional integration.

So the hypothesis tested by this study was that “water is a driver of regional integration”.

Interactions between regional integration and water management

As has been repeatedly noted, the contribution of water to regional integration will proceed primarily through its contribution to regional social and economic development. The interaction between water resource development and management and regional integration is a complex one. Indeed, the exercise of considering the one issue from the perspective of the other has provided a range of interesting insights across a range of dimensions.

An issue common to both water management and generic regional integration processes is that an immediate response to the challenges of both processes is often institutional, and focused on the establishment of organisations. Yet the historical experience is that greater success may be achieved by focusing on functional issues and addressing specific joint problems. A demonstration of productive cooperation in a particular “problem-shed”, to use the water expression, may both incentivize further cooperation and provide guidance as to the kind of organization that is required.

A related conclusion addresses another issue common to both integration and water management in respect of the different institutional arrangements that may be used. These are usefully informed by the analysis and practical experience of other regional environmental management mechanisms. In most of these, effective coordination of a range of actors in other disparate spheres of activity is necessary. While it is tempting to establish dedicated structures for this, experience in other domains suggests that it is usually better for environmental managers to engage those outside the water sector through their established political and administrative structures, if they seek to gain their support or change their behavior.

These findings reinforce the conclusion that the river basin is generally not the first choice as a unit for the operational administration and management of water resources. This complements the practical experience which suggests that the scale at which water issues need to be managed varies greatly from one locale to another and changes over time. In one era, cooperation at a sub-basin may be all that is required; within a few decades, inter-basin organization may become essential. It is thus inappropriate to prescribe any but the most general governance principles at global, regional level or even local level.

If this is the case, it is unlikely that water will become a direct driver of regional integration. And, on investigation, it transpires that even in landmark cases, such as that of the USA’s Tennessee Valley Authority, the claimed contribution of water was largely an artefact of propaganda and political strategy.

Regional institutions are not the same as regional integration

The TVA example is important because it demonstrates that the challenges raised by the research hypothesis are not just about water and its management but also about processes of regional integration. And much of the water discourse reveals a weak understanding of the nature of regional integration and the processes underway to promote it due to an uncritical acceptance of another set of dominant paradigms.

Thus, in Southern Africa, reference can be made to the existence, activities and intent of a set of deliberately structured and relatively well resourced regional institutions. But their existence does not in itself demonstrate that integration has been achieved. Their performance, in terms of their own logic, has been weak and in general, they are acknowledged to have failed to achieve the core goals that they have set for themselves. A number of reasons have been put forward for this and SADC's future strategy is currently under review.

From the broader literature, it is clear that the success of regional integration is not automatic and the Southern African experience is not unique. Participants in the process need to understand that, as Mattli (1997) put it:

> "Integration agreements do not establish integration; they only signify promises by the political leaders to engage in particular courses of action over a period of time towards the aim of tying the economies of their countries together."

In successful integration efforts, pressure to develop the arrangements comes not from political leadership at the top but from actors at the bottom; in the economic sense, these are "market actors who stand to reap large gains from transacting in increasingly integrated economies".

> "Where demand is absent …. The process of integration will quickly peter out".

Aside from "demand", says Mattli, some supply side conditions must also be met. There must also be supply, including "willingness by political actors to accommodate demands for functional integration at each step of the integration process."

So a further conclusion is that just as the establishment of an RBO does not signify that effective regional management of water has been achieved, the existence of a range of regional economic institutions is not evidence that the goals of regional integration have been served. It might indeed signal the converse, that there has been a diversion from the practical goals of regional integration.

This can be seen through the experience of the European Union, arguably the most successful and deep regional system in place today. Yet the EU emerged as the product of initial cooperation in a small number of specific problem-sheds. Decades after its establishment, there was still reluctance to enforce the establishment of regional institutions – as was seen by the fruitless efforts to impose approaches such as river basin institutions through the Water Framework Directive. These were rejected because they were not compatible with national political structures and were thus opposed by a number of national member governments who did not believe that the benefits of a hydro-centric institutional arrangement were sufficiently strong to justify changes in the wider institutional and political system.

If this is the case within an already cohesive regional system, it begs the question of whether it is appropriate to seek to enforce such hydro-centric water resource management norms in a region whose integration is still relatively weak. In this context, the strong, donor-led drive within the SADC secretariat to establish river basin organisations with strong powers is incongruous, the more so

because it is driven to a large extent by European interest groups whose enthusiasms have been rejected in their home jurisdiction.

In general, to the extent that pressure for implementation of ambitious environmental provisions through cooperative institutions on river basins is not matched by internal demand, it is unlikely to achieve the political support or successful outcomes. More substantively, promoters of primarily environmental interventions will not simply fail to achieve their goals but may also undermine broader regional cooperation and integration.

The case of the SADC Tribunal has already provided an object lesson of this in SADC. The Tribunal was established to be the arbiter in disputes arising under SADC Protocols. However, its initial broad and often fuzzy mandate was used primarily to address human resource disputes within SADC institutions. When an attempt was then made to use it to address an individual human rights complaint about the treatment of individuals in a SADC member country, its role and mandate was challenged and it was effectively disbanded (Erasmus 2012). It is being reformed with a considerably reduced mandate (Erasmus 2015).

This was an example of a regional institution being undermined by attempts to use it to achieve goals that went beyond the ambitions of the regional integration process which was supposed to support. It is therefore significant that when the Tribunal is re-established, it will have its mandate specifically restricted to inter-state matters. This experience highlights the need to understand the political context of regional interventions and to recognize the political constraints that apply.

This had long been highlighted in generic terms by Jan Tinbergen, an early advocate of greater regional and indeed global cooperation and integration with a particular interest in development of the poorer regions of the world – he chaired the UN's Committee on Development Planning from 1965 to 1972. He reflected on progress towards this ideal in the conclusion to his book International Economic Integration (a revision of the earlier version, titled, less ambitiously, "International Economic Cooperation").

> "If we have criticized their results, this does not mean that their restricted success is their own fault. For the overwhelming part the fault lies with others. In many cases, it is not the international 'machinery' which is lacking, but it is the preparedness of governments to use it in the appropriate way. In the larger part of international negotiations it is the short-term or direct national interests which are taken as a criterion rather than the long-term and indirect interest, or international interests as such. It will be difficult for representatives of national governments to diverge very much from these narrower interests because institutionally they are forced to stick to them. The cause for so little progress often is the very existence of national governments" (Tinbergen 1954).

This may be the cause for some despondency amongst those who look to regional cooperation and integration as an important pathway to the achievement of goals such as generally improved welfare or environmental protection. But it provides an important lesson for such advocates. Unless their efforts are rooted in a recognition of the real world of national sovereignty and interests and offer building blocks to achieve something better, they are unlikely to succeed.

Julius Nyerere made the same comment in the context of African integration:-

> Once you multiply national anthems, national flags and national passports, seats at the United Nations, and individuals entitled to 21 guns salute, not to speak of a host of ministers, Prime Ministers, and envoys, you would have a whole army of powerful people

> with vested interests in keeping Africa balkanized. That was what Nkrumah encountered in 1965.
>
> After the failure to establish the Union Government at the Accra Summit of 1965, I heard one Head of State express with relief that he was happy to be returning home to his country still Head of State. To this day I cannot tell whether he was serious or joking. But he may well have been serious, because Kwame Nkrumah was very serious and the fear of a number of us to lose our precious status was quite palpable (Nyerere 1997).

Just as SADC's approach to broader regional integration reflected a rather technocratic textbook approach that had been developed to respond to a very different European political climate, SADC's approach to water resource management has been significantly influenced by global political dynamics around environment and development very different to that confronted by the SADC member states. In both cases, this has led to weak outcomes, highlighting the need for the approaches used, whether for regional integration or water resource management, to be designed for the specific context rather than imported from elsewhere.

A limited but important contribution for water, nevertheless

While this may be a frustrating conclusion for advocates of water cooperation and regional integration, the picture is not necessarily as bleak as it seems. Despite the limited need for joint water infrastructure to link countries together, despite the absence of serious conflicts between countries over the impact caused by one country's use of water on its riparian neighbours, there are still opportunities and a need for cooperation over water. This includes sharing of hydrological information and coordination in the planning of water resource development, to identify and mobilise synergies where they are available. There are also clear benefits to be gained from cooperation in the management of the resources, not least to limit the impact of floods and droughts.

At another less technical level, the experience of other regions shows that the interactions between water use in one country and effects in others are often not well understood. The perception of conflict between the East African Equatorial Lake countries from which the "White Nile" flows and Egypt, which depends on the Nile has long coloured their relationships. That the fears were deliberately inflamed by colonial powers after the rise of a nationalist regime in Egypt and the nationalisation of the Suez Canal in the 1950s (International Herald Tribune 2006) may explain the concerns but does not resolve them. There has to be sufficient interaction between riparian countries to enable them to develop a more nuanced understanding of their relationship and inter-dependencies. That understanding requires the development of a range of human and social capitals, the human capital to understand the hydrologies and the social capital and networks to enable that knowledge to be shared across borders and inform new perceptions.

It is for this reason that, even as they acknowledge the absence of conflict over water and the limited opportunities for direct cooperation in its use, regional officials still believe that regional water cooperation contributes to regional integration. The opportunities that are developed, the interactions through flood warnings that are seen to reduce risks, the investments in hydropower that yield joint benefits all contribute to a more positive regional climate. As one senior official put it:-

> "It shows that regional cooperation can yield benefits and that in itself is an important message."

Conclusions

The evidence reviewed does not provide a basis to conclude that the management, development and use of shared water resources can make a major contribution to regional development and integration in Southern Africa. Nor does it suggest that it is responsible for constraining regional integration although present approaches have resulted in some missed opportunities for greater cooperation and have arguably weakened integration.

There will continue to be some cooperative projects between Southern African countries on shared rivers that will bring mutual benefits to the countries directly involved and, through economic growth and the reduction in costs of key factors of production, to the region more generally. However, the evidence suggests that the quantum of such cooperative projects on shared rivers (whether measured in terms of project numbers, cost or output) will continue be small in relation to activity organized on an exclusively national basis, even though much of that may occur on shared rivers.

Benefits may be derived from optimization in the design and coordination in the use of national infrastructure on shared rivers. These benefits are likely to be small relative to total output, as demonstrated by the Zambezi optimization studies. Some countries will continue to adopt national approaches and to develop national projects where they believe that the value of the benefits from regional cooperation may be outweighed by the risks and transaction costs inherent in that cooperation. Those risks have also been demonstrated through the impact of power shortages brought on, in part, by the failure to develop the region's hydropower potential.

The region will also benefit from cooperation between countries over the use of shared rivers, not simply through coordination of operations but where cooperation facilitates planning and implementation of national projects. Measures that improve the availability and quality of hydrological information in shared river systems and administrative systems that reduce the time taken for consultation between countries about planned projects will bring direct financial benefits.

High level agreements about the allocation of available water resources between riparian countries, if reached while water use is still relatively low as a proportion of the total available, should provide countries with a firm base for their national development planning and enable them to guide water using-sectors as to the likely trends in the availability of water and its costs. Such agreements will over time be expanded to cover more detailed parameters which will include water quality as well as the maintenance of minimum flows and environmental flows. But, again, such cooperation will facilitate the harmonious development of national projects rather than involve the promotion of joint projects.

Cooperation may be constrained over requirements for environmental conservation and protection. The establishment of agreed environmental goals is a difficult area in which there is likely to be a divergence of interests both inside countries and externally. There is already evidence that efforts to promote externally imposed global norms has constrained development in SADC countries with objections by Botswana to Namibia's proposed use of the Okavango river providing a sentinel case. There will always be a clash of interests between downstream countries, which seek higher standards, and upstream countries that will seek to avoid what they may see as unnecessarily high expenditures on water quality improvements.

Since there will be persistent efforts to regulate water related environmental matters from a global perspective, this remains a substantial risk and may paradoxically threaten cooperation. Where cooperative mechanisms are used by extra-state parties to advocate actions which impose costs on states, such interventions may simply serve to demonstrate that the transaction costs and constraints of water cooperation outweigh any benefits that may accrue. This may in turn lead to a withdrawal from cooperative arrangements and the pursuit of sub-optimal options at national level.

A particular challenge will continue to be to achieve a balance between basin, national and regional approaches to water resource planning and the more generic development planning that governments engage with at national level. The failure of SADC countries to coordinate their water resource planning and development with that for energy has had a demonstrably negative impact on the economies of the region as well as on the relationships between countries.

The study has distinguished between hydro-centric and hydro-supportive approaches to water resource management, development and use. This has parallels with the distinction between institutional and functional approaches to regional integration.

With hydro-centric approaches, environmental considerations are often dominant and water resources are planned and managed within the geographical scope of a river basin. The evidence suggests that these approaches are likely to achieve only limited impact, either in terms of their own internal objectives or in terms of their support for broader social and economic development. The failure to have greater impact is largely a result of the distance imposed by the choice of the basin as the scale of development, which isolates it from political and administrative action in other spheres, which happens at different scales. The river basin organisations that are expected to take the lead in this approach are distinguished by their isolation from mainstream economic and development planning processes at both national and regional level. Their focus on water and rivers tends to exclude those actors whose interest in water is secondary to the main priorities. This allows actors whose primary interest is simply to protect water to dominate proceedings which, in turn, further discourages wider participation and marginalizes the water management processes, weakening their acceptance and the force of any decisions.

Hydro-supportive approaches locate the management, development and use of water resources within the same geographical scale as other sectors, focusing on generic political and administrative boundaries. While they will – and must – use hydrological boundaries for the purposes of technical assessment and planning, they do not conflate these technical processes with broader processes of coordination and decision-making. As a consequence, they are better integrated with wider socio-economic activities and better able to reflect the priorities of their societies their conclusions are more easily accepted and their decisions have greater force and effect.

Effective management of shared rivers will require knowledge of the entire river system, across national boundaries. This will require information both about the resource and the uses to which it is being put in neighbouring jurisdictions. This will best be obtained through cooperative institutional arrangements which may be formal organisations or informal networks of officials and technicians. The real challenge will be to develop the social capital inherent in such river-basin relationships without weakening the social capital inherent in its integration with national inter-sectoral political, administrative and economic networks.

If such social capital is allowed and encouraged to develop, in both spheres, the water sector may provide a valuable model for regional cooperation and integration more generally. This would be true to the functional approach that is returning to vogue in regional relations and suggests that

regional integration will occur when mechanisms are put in place to give expression to practical common interests. To the extent that water provides a medium for the building of such social capital, it may still make a significant contribution to broader regional integration.

Recommendations

The principal recommendation is to recognise the limited and nuanced contribution that the development, management and use of water resources can make to regional development and integration, and to design strategies that reflect this reality.

Such strategies should acknowledge that most water development, management and use occurs local and national scales, rather than regional. A primary objective should be to develop and support technical capabilities at these scales.

The river basin must be recognized as an important technical unit for monitoring water resources and planning their development and management. Equally, it should be understood that this does not mean it should be the primary scale for their governance and administration.

National governments should ensure that their water administrations engage with water using sectors and other stakeholders to ensure that their interests are communicated and considered in cross border interactions.

In order to ensure the engagement of water users and other stakeholders in the governance and administration of development, management and use of water, water resource management should be organized at a scale that facilitates interactions beyond the water sector. This will often require a high level institution to take national oversight and support political and administrative interactions with other sectors of activity; it will need both to delegate powers and functions to more local levels but also to maintain politically mandated linkages across national borders.

Cross-border communication and coordination regarding shared rivers should be organized as appropriate to the particular circumstances. A wide range of institutional mechanisms can be used. Low-key bilateral committees can be established by countries which share rivers on which there is limited development. Full scale joint commissions with permanent staff may be considered on intensively used rivers where there is a range of functions to perform. Where joint development projects are implemented, project specific institutions may be appropriate.

In shared rivers, countries should be encouraged to cooperate in the development and management of shared monitoring systems and to coordinate their planning and development of the resource.

Relationships between countries that share rivers should be guided by agreed sets of principles such as the SADC Protocol on Shared Rivers. However, care should be taken to ensure that such agreements are not used by advocacy groups to bypass national democratic processes or to enforce global norms as a short-cut to achieving their specific objectives.

Similarly, while external support and engagement in water resource development, management and use should be welcomed, such support should not be used as a mechanism to impose external norms which may be inappropriate for the circumstances of the recipient countries.

Finally, since the nature of water resources and the social, political, economic and environmental contexts in which they are used varies greatly from place to place, the development and application of global norms beyond the basic generic principles should be avoided.

References

Adams, R. M. (1966). The evolution of urban society: early Mesopotamia and prehispanic Mexico. Transaction Publishers.

AfDB, 2010. African Development Bank Swaziland: Lower Usuthu Smallholder Irrigation Project (LUSIP). Project completion report, ADF/BD/IF/2010/206, 2010

AfDB, 2011. African Development Bank, Niger – proposal for a grant of UA 21.02 million from the GAFSP resources and an ADF loan of UA 9.34 million to finance the water mobilisation project to enhance food security in Maradi, Tahoua and Zinder regions (PMERSA-MTZ), ADF/BD/WP/2011/93.

AfDB, 2014a. African Development Bank, AfDB, 2014a. African Development Bank, Regional Operations Selection and Prioritization Framework (Revised Framework), Tunis.

AfDB, 2014b. African Development Bank, Multinational Zambia and Zimbabwe Kariba Dam Rehabilitation Project, Tunis.

Agnew C and Woodhouse P, Water resources and development, Routledge, Oxford, 2010.

Ahram Online 2013, Egypt's Coptic pope holds meeting on Nile row before meeting Ethiopian counterpart, 11 Jun 2013 (at) http://english.ahram.org.eg/News/73746.aspx

AIM 2007. Agencia de Informacao de Mocambique, Cahora Bassa is ours – President Guebuza, AIM reports No.351, 7th December 2007 http://www.poptel.org.uk/mozambique-news/newsletter/aim351.html

AIM 2010. Agencie de Informacao Mocambicana, Malawian military attaché detained, and released, AIM Bulletin (accessed at) http://clubofmozambique.com/solutions1/sectionnews.php?secao=mozambique&id=19901&tipo=one

Akamatsu, Kaname. "A historical pattern of economic growth in developing countries." *The Developing Economies* 1.s1 (1962): 3-25.

Alaerts, G. (2003). Institutions for river basin management: a synthesis of lessons in developing cooperative arrangements. Integrated Water Management at the River Basin Level. An Institutional Development Focus on River Basin Organizations (in) Alaerts, G., & Le Moigne, G. (2004). Integrated Water Management at River Basin Level: An Institutional Development Focus on River Basin Organization.".World Bank.

Allan T, 2003. IWRM/IWRAM: a new sanctioned discourse? Occasional Paper 50, SOAS Water Issues Study Group, School of Oriental and African Studies/King's College London, London.

Allan JA, 2005. Water in the Environment/Socio-Economic Development Discourse: Sustainability, Changing Management Paradigms and Policy Responses in a Global System. Government and Opposition, 40(2), 181-199.

Allouche, J. (2007). The governance of Central Asian waters: national interests versus regional cooperation. Disarmament Forum Vol. 4, pp. 45-56.

Almeida L 2004, The Zambezi River Basin Action Plan (ZACPLAN), (presented at) 1st General Assembly of ANBO and INBO, Dakar. (accessed at) http://www.inbo-news.org/IMG/pdf/Pres_ZACPLAN_Dakar2004.pdf

Andean Community 2011, *Estrategia Andina para la Gestión Integrada de los Recursos Hídricos*, Decisión 763, 23rd Reunion Ordinaria del Consejo Andino de Ministros de Relaciones Exteriores, Lima, Perú, 2011.

Andersson, L., Wilk, J., Todd, M. C., Hughes, D. A., Earle, A., Kniveton, D. & Savenije, H. H. (2006). Impact of climate change and development scenarios on flow patterns in the Okavango River. *Journal of Hydrology*, *331*(1), 43-57.

Antonelli, M., & Sartori, M. (2014). Unfolding the Potential of the Virtual Water Concept. What is still under debate?. What is Still Under Debate, SIS Working Paper No 2014-11 (accessed at) http://mpra.ub.uni-muenchen.de/60501/1/MPRA_paper_60501.pdf

Aspinwell and Schneider (2001) (eds). The rules of integration: Institutionalist approaches to the study of Europe, Manchester University Press.

Aylward B, 2009. Economic Valuation of Basin Resources, Final Report to EPSMO project of the UN FAO, Okavango River Basin Transboundary Diagnostic Analysis Technical Report, OKACOM: Maun, Botswana

Baccini, Leonardo and Dür, Andreas (2012) The new regionalism and policy interdependence British Journal of Political Science, 42 (1). 57-79. ISSN 0007-1234.

Bach DC, 2003: New regionalism as an alias: regionalization through trans-state networks. In: Grant JA and Søderbaum F. (eds), The New Regionalism in Africa, pp. 21-30. Ashgate, Aldershot.

Bäckstrand, K., Khan, J., Kronsell, A., & Lövbrand, E. (2010). The promise of new modes of environmental governance (in) *Environmental politics and deliberative democracy: Examining the promise of new modes of governance (ed)*, 3-27, Edward Elgar.

Balsiger 2011. New environmental regionalism and sustainable development, Jörg Balsiger, Procedia Social and Behavioral Sciences 14 (2011) 44-48.

Balsiger J. and Debarbieux B. 2011. Major challenges in regional environmental governance research and practice, Procedia Social and Behavioral Sciences 14 (2011) 1-8.

Bart, Jason. "Weaponizing Water: Water and Energy as Sources of Conflict among the Central Asian Soviet Successor States." *Michigan State International Law Review* 22.1 (2013): 409.

Bassole 2014, Infrastructure Development and Regional Integration: What Challenges for Africa? AU/ecA Conference of Ministers responsible for Regional Integration, Swaziland – 14 to 18 July 2014

Berkhout P, Silvis H and Terluin I, 2013. Agricultural Economic Report 2013 – Summary, Agricultural Economics Research Institute, Hague).

Boege and Turner 2007. Access to freshwater and Conflict Prevention, Management and Resolution in Africa, Finnish Institute of International Affairs & the Centre for International Cooperation and Security, Helsinki.

Borger GJ and Ligtendag WA, 1998. Jnl Coastal Conservation, v4 n2, 109-114.

Bullock and Acreman, M. 2003. The role of wetlands in the hydrological cycle, Hydrol. Earth Syst. Sci., 7, 358-389, doi:10.5194/hess-7-358-2003.

Caponera D, Principles of water law and administration, Balkema, Rotterdam, 1992.

Carlson, Andrew 2013. Who Owns the Nile? Egypt, Sudan, and Ethiopia's History-Changing Dam, Origins: Current Events in Historical Perspective, 6(6).

Cerqueira Leite, R. C. D., Verde Leal, M. R. L., Barbosa Cortez, L. A., Griffin, W. M., & Gaya Scandiffio, M. I. (2009). Can Brazil replace 5% of the 2025 gasoline world demand with ethanol? Energy, 34(5).

Chambote R, 2014. The Controversy about the Navigation of Zambezi and Chire Rivers in Diplomatic Relations between Mozambique and Malawi, (accessed at) http://macua.blogs.com/files/the-controversy-about-the-navigation-of-zambezi-and-chire-rivers-in-diplomatic-relations-between-mozambique-and-malawi-august-1-2014.pdf

Chaturvedi MC, 2012. India's waters: advances in development and management, CRC Press, Boca Raton

Church, Jon Marco. “Environmental Regionalism: The Challenge of the Alpine Convention and the “Strange Case” of the Andean Community.” CID Research Fellow and Graduate Student Working Paper No. 47. Center for International Development at Harvard University, September 2010

CIWA 2014. Cooperation in International Waters in Africa (CIWA), Overview (accessed at) http://www.worldbank.org/en/programs/cooperation-in-international-waters-in-africa

Cogels, O. 2014. Hydro-diplomacy: Putting cooperative investment at the heart of transboundary water negotiations. In Pangare, G. (Ed), Hydro diplomacy. Sharing water across borders, pp. 67-74. New Delhi, India: Academic Foundation.

Conca, K. 2012. The rise of the region in global environmental politics. Global Environmental Politics 12(3): 127

Collins Kathleen, 2009. Economic and Security Regionalism among Patrimonial Authoritarian Regimes: The Case of Central Asia, Europe-Asia Studies Volume 61, Issue 2, 2009 pages 249-281

COMESA-EAC-SADC 2015. Focal area 3: Infrastructure development (accessed at) http://www.comesa-eac-sadc-tripartite.org/intervention/focal_areas/infrastructure, February 2015.

Conca 2002. The World Commission on Dams and trends in global environmental governance, Politics and the Life Sciences, vol. 21, no. 1.

Copelovitch MS. The International Monetary Fund in the Global Economy, Cambridge University Press, 2010

Crutzen, Paul J. The “anthropocene”. Springer Berlin Heidelberg, 2006.

CVCE, The European organisations, Centre Virtuel de la Connaissance sur l'Europe (at) http://www.cvce.eu/obj/the_european_organisations-en-a1fb4f50-604c-400b-9906-a6c7e10e6230.html, 2012

DBSA/GWP 2012. Development Bank of Southern Africa/Global Water Partnership, Regional Approaches to Food and Water Security in the Face of Climate Challenges, May 2011 Workshop, (edited proceedings), DBSA, Midrand.

DFA 2006. Department of Foreign Affairs Annual Report 2005-6, Department of Foreign Affairs: Pretoria.

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. Science, 302(5652), 1907-1912.

Doctor, M. (2013). Prospects for deepening Mercosur integration: Economic asymmetry and institutional deficits. Review of International Political Economy, 20(3), 515-540.

Draper, D., (2011) Rethinking the (European) foundations of sub-Saharan African regional economic integration, OECD Development Centre Working Paper No. 293, OECD, Paris.

DRBC 1961. Delaware River Basin Compact, Delaware River Basin Commission, 1961

Duchin F & López-Morales C, 2012. Do water-rich regions have a comparative advantage in food production? Improving the representation of water for agriculture in economic models. Economic Systems Research, 24(4), 371-389.

Duffy C.A. and Feld W. J. (1980). “Whither regional integration theory?” in Comparative regional systems: West and East Europe, North America, the Middle East and developing countries, New York: Pergamon Press

DWA (2010) ‘An assessment of rainfed crop production potential in South Africa’s neighbouring countries’, Report No.P RSA 000/00/12510, Pretoria: Department of Water Affairs.

Dyson, M., Bergkamp, G. and Scanlon, J., (eds), , 2008. Flow – The essentials of environmental flows, 2nd Edition. Gland, Switzerland: IUCN. Reprint, Gland, Switzerland: IUCN

Eberts, R. W. (1990). Public infrastructure and regional economic development. Economic Review, 26(1), 15-27

ECA/AU 2014. Africa Regional Integration Index, AU/ECA Conference of Ministers responsible for Regional Integration, Swaziland – 14 to 18 July 2014

Ekbladh, 2002. "Mr. TVA": Grass-Roots Development, David Lilienthal, and the Rise and Fall of the Tennessee Valley Authority as a Symbol for U.S. Overseas Development, 1933-1973, Diplomatic History, Vol 26, No. 3, 2002.

Elliott L. 2011. ASEAN and environmental governance: rethinking networked regionalism in Southeast Asia Procedia Social and Behavioral Sciences 14 (2011) 61-64

Erasmus G, 2012. What future now for the SADC Tribunal? A plea for a constructive response to regional needs, TRALAC Working Paper US15WP01/2015, Stellenbosch: TRALAC.

Erasmus G, 2015. The new Protocol for the SADC Tribunal, TRALAC Trade Policy Brief, Stellenbosch: TRALAC.

Erll, A., (2010), "Regional integration and (trans) cultural memory" in Asia Europe Journal, Vol. 8, p.305-315

Erlikh, Ḥ. (2002). *The Cross and the River: Ethiopia, Egypt, and the Nile*. Lynne Rienner Publishers.

Ethier, W. J. "The New Regionalism," Economic Journal 108 (449), 1998, pp 1149-1161.

European Commission 2000. Framework for Community action in the field of water policy, Directive 2000/60/EC of the European Parliament and of the Council, 23 October 2000

European Commission 2011. Cohesion Policy 2014-2020 – Investing in growth and jobs, Luxembourg.

European Commission 2012. Using Political Economy Analysis to improve EU Development Effectiveness, A DEVCO Background Note, Draft January 2012, (accessed at: http://capacity4dev.ec.europa.eu/political-economy/document/using-political-economy-analysis-improve-eu-development-effectivenessdraft-0 may2014

European Commission 2012b. European Overview (1/2), (Accompanying the document Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans, Commission Staff Working Document SWD(2012) 379 final 1/30.

Farvar, M. T., & Milton, J. P. (1972). *The careless technology*. Garden City, New York, NY: Natural History Press.

Fechter W, 2011. Regional Bioenergy from Cane Vision, Tongaat Hulett, Durban (presented at) Workshop on Regional Approaches to Food and Water Security in the Face of Climate Challenges, (DBSA/GWP 2012)

Foster C. 2000. Harvard Environmental Regionalism Project, Discussion Paper 2000-11, Belfer Center for Science and International Affairs, Harvard University, Cambridge Mass. (accessed at) http://belfercenter.ksg.harvard.edu/publication/2781/harvard_environmental_regionalism_project.html

Fox, J., & Ledgerwood, J. (1999). Dry-season flood-recession rice in the Mekong Delta: two thousand years of sustainable agriculture?

Freudenberger, M. S., & Freudenberger, K. S. (1993). *Pastoralism in peril: pressures on grazing land in Senegal*. IIED. Drylands programme.

Fung and Wright (2003). Deepening democracy: Institutional innovations in empowered participatory governance (Vol. 4). Verso.

Garrick et al. 2014. Garrick, D., G. Anderson, D. Connell, J. Pittock, eds. Federal Rivers: Water Management in Multi-Layered Political Systems. Cheltenham: Edward Elgar Publishing.

Giordano M & Shah T (2014). From IWRM back to integrated water resources management, International Journal of Water Resources Development, 30:3, 364-376, DOI: 10.1080/07900627.2013.851521

Frédéric Giraut, Bioregionalization and territorial complexity in the global South, Procedia Social and Behavioral Sciences 14 (2011) 49-52

GIZ 2014. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Transboundary Water Management: Support to cooperation on shared waters,

Grant JA and Søderbaum F. (eds), The New Regionalism in Africa. Ashgate, Aldershot.

Greg EH, Reasons for allowing country mills (textile) driven by water-power to work up time lost by drought or floods, February 1878, (accessed at) http://www.spinningtheweb.org.uk/sea_cat_display.php?irn=100610&sub=&theme=overview&crumb=

Grey D, 2013. Mekong Basin Planning: The Basin Development Story, Mekong River Commission

GWP 2005. Global Water Partnership, Application to become a partner of the Global Water Partnership, (accessed at: http://www.gwp.org/Global/The%20Challenge/Resource%20material/ GWP_Application_form_ ENGLISH.doc?epslanguage=en , September 2014)

Haas, E. B. (1961). "International Integration: The European and the Universal Process", International Organization 15.

Haas, B., (1976). "Turbulent fields and the theory of regional integration", in International Organisation, Vol. 30, (2) pp. 173-212

Halcro-Johnston J et al. (2004). Regional Strategic Action Plan on Integrated Water Resources Development and Management (RSAP-IWRM). Mid-term Review. Review Report. Gaborone: SADC

Hall, P. and Taylor, R.C.R. [1996]. "Political Science and the Three New Institutionalisms", Political Studies 44[5]

Hamududu, B., & Killingtveit, A. (2012). Assessing climate change impacts on global hydropower. Energies, 5(2), 305-322.)

Harrell, J.A. and Storemyr, P. (2009) Ancient Egyptian quarries—an illustrated overview. In Abu-Jaber, N., Bloxam, E.G., Degryse, P. and Heldal, T. (eds.) QuarryScapes: ancient stone quarry landscapes in the Eastern Mediterranean, Geological Survey of Norway Special Publication,12, pp. 7-50.

Harris LM (2002). Water and Conflict Geographies of the Southeastern Anatolia Project, Society & Natural Resources: An International Journal, 15:8, 743-759,

Harrison J. (2013) (Configuring the New 'Regional World': On being Caught between Territory and Networks, Regional Studies, Vol. 47.1, pp. 55-74, January 2013

Hartzenberg T and Kalenga P, 2014. Trade Issues in the Review of the SADC Regional Indicative Strategic Development Plan, Trade Law Centre, Stellenbosch, South Africa

Hassan FA, A River Runs Through Egypt – Nile Floods and Civilization, Geotimes April 2005, accessed at http://www.geotimes.org/apr05/feature_NileFloods.html

Hendriks, F. (2004). The poison is the dose: Or how 'more egalitarianism'may work in some places but not in all. *Innovation: The European Journal of Social Science Research*, *17*(4), 349-361.

Hendriks, F., & Michels, A. (2011). Democracy Transformed? Reforms in Britain and The Netherlands (1990-2010). *International Journal of Public Administration*, *34*(5), 307-317.

Hendriks, F., & Tops, P. (2003). Local public management reforms in the Netherlands: Fads, fashions and winds of change. *Public Administration*, *81*(2), 301-323.

ICPR 1999. Convention on the Protection of the Rhine Bern, International Commission for the Protection of the Rhine, April 12th 1999

ICPR 2014. About Us, International Commission for the Protection of the Rhine (accessed at) http://www.iksr.org/index.php?id=32&L=3

ICWE (1992) The Dublin statement on water and sustainable development. International Conference on Water and the Environment (ICWE), Dublin, 1992

IEA 2012, Hydropower Technology Roadmap: Synopsis, Niels Nielsen, Secretary, IEA Hydropower Implementing Agreement

International Herald Tribune, 2006. Britain had secret plan to cut flow of Nile River, (accessed on 18 February 2014 at) http://www.iht.com/articles/ap/2006/12/01/europe/EU_GEN_Britain_Suez.php

Allen F. Isaacman, and Barbara S. Isaacman,2013. Dams, Displacement, and the Delusion of Development: Cahora Bassa and Its Legacies in Mozambique, 1965-2007. (New African Histories.) Athens, Ohio: Ohio University Press.

IUCN, 2014. IUCN's Policy Brief on Water, Food, Energy Nexus and the Dimension of Nature, (at) http://cmsdata.iucn.org/downloads/strategies_for_a_green_economy_investing_in_natuer_as_water_infrastructure_1.pdf

IWMI 2007. : International Water Management Institute, Comprehensive Assessment of Water Management in Agriculture. 2007. Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture. Earthscan/IWMI

Jackson W, 2011. Regionalization at the International Union for the Conservation of Nature (IUCN), Procedia Social and Behavioral Sciences 14 (2011) 53-56

Jacobs I, 2010. Norms and transboundary co-operation in Africa: The cases of the Orange-Senqu and Nile rivers, PhD thesis, University of St. Andrews.

Jägerskog, A. (2002). The sanctioned discourse – a crucial factor for understanding water politics in the Jordan river basin (SOAS Occasional Paper No 41).

Jalilov, S. M., Amer, S. A., & Ward, F. A. (2013). Water, Food, and Energy Security: An Elusive Search for Balance in Central Asia. *Water resources management*, *27*(11), 3959-3979.

Jones, A. R. (1961). The Financing of TVA. *Law and Contemporary Problems*, 725-740.

Jongerden J 2009. Crafting space, making people: the spatial design of nation in modern Turkey. Eur J Turk Stud 2009. Available at: http://edepot.wur.nl/108719 (Accessed 1 September 2014)

Jonglei Investigation Team 1954. The Equatorial Nile Project and Its Effects in the Anglo-Egyptian Sudan: Being the Report of the Jonglei Investigation Team. Sudan Government, 1954.

Jovanovic, M. N. (2007). *The economics of international integration*. Edward Elgar Publishing.

Juraev S, 2013. Three key challenges for Central Asia, , Central Asia 2030 , EUCAM Watch No. 15 , March 2013 (accessed at) http://www.eucentralasia.eu/uploads/tx_icticontent/EUCAM-Watch-15.pdf

Kazakhstan et al. 1992. Agreement Between the Republic of Kazakhstan , the Republic of Kirgyzstan, the Republic of Uzbekistan, the Republic of Tajikistan and Turkmenistan on Cooperation in the Field of Joint Water Resources Management and Conservation of Interstate Sources, Alma-Ata 18 February, 1992 (accessed at) http://www.ce.utexas.edu/prof/mckinney/papers/aral/agreements/ICWC-Feb18-1992.pdf

Katzenstein PJ, 1996. Regionalism in comparative perspective. *Cooperation and Conflict*, *31*(2), 123-159

Keane, J., Calì, M., & Kennan, J. (2010). Impediments to intra-regional trade in sub-Saharan Africa. Overseas Development Institute for the Commonwealth Secretariat, London.

Keating, M. (1997). The invention of regions: political restructuring and territorial government in Western Europe. Environment and Planning C, 15, 383-398.

Kitchens, C. (2014). The Role of Publicly Provided Electricity in Economic Development: The Experience of the Tennessee Valley Authority, 1929-1955.The Journal of Economic History, 74(02), 389-419.

Kline, P. M., & Moretti, E. (2013). Local economic development, agglomeration economies, and the big push: 100 years of evidence from the Tennessee Valley Authority (No. w19293). National Bureau of Economic Research.

Kumalo D, On African cohesion and international cohesion, Regions and Cohesion, v2 (2), 2012.

Lalbahadur A 2013. Mozambique and Malawi: Recalibrating a Difficult Relationship, South African Institute of International Relations, South African Foreign Policy and African Drivers Programme, SAIIA Policy Briefing 68, Johannesburg.

Laursen, F., (2008). "Theory and practice of regional integration" in Jean Monnet/Robert Schuman Paper Series, Vol. 8(3)

LAWA 2003. German Guidance Document for the implementation of the EC Water Framework Directive, Länderarbeitsgemeinschaft Wasser (LAWA), Updated version of 30.04.2003 (accessed at) http://www.lawa.de/documents/Arbeitshilfe_englisch_d34.pdf

Lenton R and Muller M, 2009. Integrated Water Resource Management in Practice: Better Water Management for Development, p.209, Earthscan, London.

Light, Stephen S; Wodraska, John R 1990. Forging a new state-federal alliance in water management: Institutional challenges in water management, Nat Resources J, V.30, 477

Linton, J. (2014). Modern water and its discontents: a history of hydrosocial renewal. Wiley Interdisciplinary Reviews: Water, 1(1), 111-120.

Loucks DP and van Beek E, 2005. Water Resources Systems Planning and Management. An Introduction to Methods, Models and Applications, Studies and Reports in Hydrology, UNESCO Publishing & WL Delft Hydraulics

Lucas AR, Industrial Milling in the Ancient and Medieval Worlds: A Survey of the Evidence for an Industrial Revolution in Medieval Europe, Technology and Culture, Vol. 46, No. 1 (Jan., 2005).

Lucio F, Muianga A, & Muller M, 2007. Flood management in Mozambique (in) Hellmuth, M.E., Moorhead, A., Thomson, M.C., and Williams, J. (eds) 2007. Climate Risk Management in Africa: Learning from Practice. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA

Makgetlaneng S, 2014. Why Southern Customs Union should not be an economic community. Occasional Paper, Africa Institute, Pretoria.

Mattli W, (1999). The Logic of Regional Integration; Europe and Beyond, Cambridge: University Press.

Mbeki 2002. Address to the Assembly of the Republic of Mozambique, 2 May 2002 (accessed at) http://www.unisa.ac.za/contents/colleges/docs/2002/tm2002/tm050202.pdf

McCaffrey S, 2001. The contribution of the UN convention on the law of non-navigational uses of international watercourses, Int j global environmental issues v1 nos. 3/4

McCornick, P.; Smakhtin, V.; Bharati, L.; Johnston, R.; McCartney, M.; Sugden, F.; Clement, F.; McIntyre, B. 2013. Tackling change: Future-proofing water, agriculture, and food security in an era of climate uncertainty. Colombo, Sri Lanka: International Water Management Institute (IWMI). 36p. doi: 10.5337/2013.213

Merrey, D. J. (2008). Is normative integrated water resources management implementable? Charting a practical course with lessons from Southern Africa, Physics and Chemistry of the Earth, Parts A/B/C, 33(8), 899-905.

Mehta L, Alba R, Bolding A, Denby K, Derman B, Hove T, Manzungu E, Movik S, Prabhakaran P, & van Koppen B, 2014. The politics of IWRM in Southern Africa, International Journal of Water Resources Development, 30:3, 528-542, DOI: 10.1080/07900627.2014.916200

Meyer, William B., and Charles H.W. Foster. "New Deal Regionalism." Discussion Paper E-2000-02, Kennedy School of Government, Harvard University.

Michel, L. (2008). *Africa-Europe: the indispensable alliance*. Office for Official Pub. European Communities, Brussels.

Miketa, A., & Merven, B. (2013). Southern African Power Pool: Planning and Prospects for Renewable Energy. *IRENA, Abu Dhabi.*

Mmegi 2014. Water supply situation , (accessed at) http://www.mmegi.bw/index.php?aid=45068

Molle, F. 2008. Nirvana concepts, narratives and policy models: Insight from the water sector. Water Alternatives 1(1): 131-156

Molle, F., Mollinga, P. P., & Wester, P. (2009). Hydraulic bureaucracies and the hydraulic mission: flows of water, flows of power. *Water Alternatives*, *2*(3), 328-349.

Moravcsik, A. [1991]. "Negotiating the Single European Act: National Interests and Conventional State Craft in the European Community", International Organization 45:pp.19-56.

Mukhtarov F and Gerlak AK, 2013. River Basin Organizations in the Global Water Discourse: An Exploration of Agency and Strategy, Global Governance; Apr-Jun 2013; 19, 2; pg. 307

Mukhtarov F and Gerlak AK, 2014. Epistemic forms of integrated water resources management: towards knowledge versatility, Policy Sci (2014) 47:101-120

Muller M 2008. The challenges of implementing an African water resource management agenda (in) Africa In Focus – Governance in the 21st century, (ed) Kondlo K, Ejiogu C, HSRC Press. http://www.hsrcpress.ac.za/product.php?productid=2283&cat=0&page=1&featured&freedownload=1

Muller M, 2010. Fit for purpose: taking integrated water resource management back to basics, Irrigation and Drainage Systems: Volume 24, Issue 3 (2010), Page 161.

Muller M, 2012. Polycentric governance: water management in South Africa, Procs Inst Civil Eng – Management, Procurement and Law, Vol 165 (MP0), Pages 1-8 http://dx.doi.org/10.1680/mpal.2012.165.0.1

Muller M, 2014. The new dynamics of water resource development and management in Southern Africa (presented at) 4th IESE International Conference: State, natural resources and conflict: Actors and dynamics, Maputo.

Muller, M. 2015. The 'nexus' as a step back towards a more coherent water resource management paradigm. Water Alternatives 8(1): 675-694

Muller M and Yang X, 2009. Taming the Yangtze River by enforcing infrastructure development under IWRM (with Professor Yang Xiaoliu), (chapter in) Integrated Water Resource Management in Practice: Better Water Management for Development, (ed Lenton and Muller), Earthscan, London, 2009)

Nakayama, M. (1998). Politics behind Zambezi Action Plan. Water Policy, 1(4), 397-409.

Needham, Joseph (Review of) Oriental Despotism, Science and Society 1959 Volume XXIII pp. 58-65

Nkrumah G 2012. Africa's new Nasserist leaf, Al Ahram Weekly, 19-25 July, Issue No. 1107, Cairo.

Nkrumah, K., 1963. *Africa must unite*. London: Heinemann.

NPC/DBSA 2012. National Planning Commission/Development Bank of Southern Africa, Understanding National Development Planning and its Contribution to Inter-Sectoral Regional Integration, (Discussion

document for workshop of SADC country national planning agencies held at DBSA in August 2012), National Planning Commission, Pretoria.

Nsekela AJ, 1981. Southern Africa: Towards Economic Liberation, Rex Collings, London 1981

Nyerere JK 1997. Africa Must Unite, edited excerpts from a public lecture delivered in Accra to mark Ghana's fortieth Independence Day anniversary celebrations, (accessed at) http://www.afrikaglobalnetwork.com/htm/africa_unite.htm

OECD (2011), Water Governance in OECD Countries: A Multi-level Approach, OECD Studies on Water, OECD Publishing. http://dx.doi.org/10.1787/9789264119284-en

OECD/ITF, 2012. Trends in the Transport Sector 1970-2010, OECD/International Transport Forum, Paris

OECD 2014, Water Governance in the Netherlands: Fit for the Future, OECD Publishing

OKACOM 2014. Synthesis Report Cubango-Okavango River Basin Water Audit (CORBWA) Project, Permanent Okavango River Basin Water Commission, Food and Agriculture Organization: Rome.

ORASECOM 2014. Strategic Action Programme for the Orange-Senqu River Basin, Orange-Senqu River Commission, Pretoria.

Ostrom E 2002, Type of good and collective action, Paper presented on February 22, 2002 at the University of Maryland, Collective Choice Center and IRIS in honor of Mancur Olson, accessed at, http://www.bsos.umd.edu/umccc/ostrom.pdf November 2011

Ostrom E, 2008. Building trust to solve commons dilemmas: Taking small steps to test an evolving theory of collective action, Workshop in Political Theory and Policy Analysis Indiana University, Center for the Study of Institutional Diversity, Arizona State University

Ostrom E, 2009. Design Principles of Robust Property-Rights Institutions: What Have We Learned? (2008) (in) Property Rights and Land Policies, K. Gregory Ingram, Yu-Hung Hong, eds., Cambridge, MA: Lincoln Institute of Land Policy.

Park TK 1992. Early trends toward class stratification: Chaos, common property, and flood recession agriculture. American Anthropologist, 94(1), 90-117).

Peters-Berries C, 2010. Regional Integration in Southern Africa – A Guidebook, INWENT, Bonn.

Peterson DF 1966. Man and His Water Resource, Utah State University (Utah State University DigitalCommons@USU USU Faculty Honor Lectures 5-1-1966) (Accessed at http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1050&context=honor_lectures)

Pfeiffera J and Leentvaar, 2013. Ellen Pfeiffera Jan Leentvaar Knowledge leads, policy follows? Two speeds of collaboration in river basin management, Water Policy 15 (2013) 282-299)

Pierson, P. [1996]. "The Path to European Integration: A Historical Institutionalist Analysis", Comparative Political Studies 29 [2]: 123-63.

Price DH, 1994. Wittfogel's Neglected Hydraulic/ Hydroagricultural Distinction, Journal of Anthropological Research, Vol. 50, No. 2 (Summer, 1994), pp. 187-204

Priscoli, Water and civilization: using history to reframe water policy debates and to build a new ecological realism, Water Policy 1 (1998) 623-636.

Ramberg, L. 199? A Pipeline from the Okavango River. Ambio, 2(2), 129.

Rampa F and van Wyk L, 2014. Regional food security and water in SADC: The potential for sectoral synergies within CAADP for the implementation of the SADC Regional Agricultural Policy, ECDPM Discussion Document, European Centre for Development Policy Management (accessed at) www.ecdpm.org/dp159

Riggirozzi, P. (2012). Region, regionness and regionalism in Latin America: towards a new synthesis. New Political Economy, 17(4), 421-443.

SADC 1995. Southern African Development Community, Protocol on Shared Watercourses in the Southern African Development Community (SADC) Region (signed at Maseru 16 May 1995), SADC, Gaborone.

SADC 1996. Southern African Development Community, Protocol on Energy in the Southern African Development Community Region, Gaborone.

SADC 2000. Southern African Development Community, Protocol on Energy in the Southern African Development Community Region, Gaborone.

SADC 2003. Southern African Development Community, Regional Indicative Strategic Development Plan (RISDP), Gaborone.

SADC 2005a. Southern African Development Community, Regional Water Policy, Gaborone.

SADC 2005b. Southern African Development Community, Regional Strategic Action Plan on Integrated Water Resources Development and Management Annotated Strategic Plan 2005 to 2010, Gaborone.

SADC 2010. Southern African Development Community, Regional Strategic Action Plan on Integrated Water Resources Development and Management (2011-2015) RSAP III, Gaborone.

SADC 2011. SADC Water Sector, Water Infrastructure Investment Conference 2011 – Regional Portfolio of Priority Projects, Gaborone.

SADC 2012a. Southern African Development Community, Desk Assessment of the Regional Indicative Strategic Development Plan 2005-2010, Gaborone.

SADC 2012b. Southern African Development Community, Regional Infrastructure Development Master Plan, Gaborone.

SADC 2013a. SADC: regional agricultural policy, Southern African Development Community, Gaborone

SADC 2013b. Southern African Development Community, Mphanda Nkuwa Project Brief (accessed at http://invest-tripartite.org/wp-content/uploads/2013/06/9-Mphanda-Nkuwa-Hydropower-Project-Brief-29-05-2013.pdf)

SADC 2014a. About SADC (accessed at) http://www.sadc.int/about-sadc/sadc-institutions/secretariat/

SADC 2014b. SADC statistics yearbook (accessed at) http://www.sadc.int/information-services/sadc-statistics/sadc-statiyearbook/#Macro

SADCC 1980. Southern African Development Coordination Conference, Lusaka Declaration (in) Nsekela 1981. Southern Africa: Towards Economic Liberation, Rex Collings, London

SADC-HYCOS 2002. SADC--HYCOS PHASE 2 Implementation Document (accessed at) https://sadchycos.dwaf.gov.za/Key%20Documents/PROJ%20DOC%20SADC_HYCOS_revised_June~Screen.pdf.

SADC/SARDC and others 2012. Zambezi River Basin Atlas of the Changing Environment. SADC, SARDC, ZAMCOM, GRID-Arendal, UNEP. Gaborone, Harare and Arendal

Sadoff, C. W., & Grey, D. (2005). Cooperation on international rivers: A continuum for securing and sharing benefits. Water International, 30(4), 420-427.

SARDC 2001. The Southern African Research and Documentation Centre, 20 years of development in Southern Africa. A sectoral review of regional integration in SADC, SARC, (accessed at) http://www.sardc.net/editorial/dev/dev4/EnvSector.html

Schaffer D, 1984. Environment and TVA: Toward a Regional Plan for the Tennessee Valley, 1930s, Tennessee Historical Quarterly, Vol. 43, No. 4 (Winter 1984), pp. 333-354

Scheumann W and Klaphake A, 2001. Freshwater Resources and Transboundary Rivers on the International Agenda: From UNCED to RIO+10 Bundesministeriums für wirtschaftliche Zusammenarbeit und Entwicklung, Bonn.

Schmeier S, Gerlak AK and Schulze S, 2013. Who Governs Internationally Shared Watercourses? Clearing the Muddy Waters of International River Basin Organizations. Earth System Governance Working Paper No. 28. Lund and Amsterdam: Earth System Governance Project.

Schoeman M 2002. From SADCC to SADC and beyond: the politics of economic Integration, at http://www.alternative-regionalisms.org/wpcontent/uploads/2009/07/schoeman_fromsadcctosadc.pdf

Scudder, T., & Colson, E. (1972). The Kariba Dam project: Resettlement and local initiative. *Technology and Social Change. Macmillan, New York*.

Scudder, T. (1991). Need and Justification for Maintaining Transboundary Flood Regimes: The Africa Case. *Natural Resources Jnl.*, *31*, 75.

Seckler, D., Barker, R., & Amarasinghe, U. (1999). Water scarcity in the twenty-first century. *International Journal of Water Resources Development*,*15*(1-2), 29-42.

Selznick Philip, TVA and the grass roots – A study in the sociology of formal organization, University Of California Press, Berkeley and Los Angeles, 1949

Shah, T. (2011). Past, present, and the future of canal irrigation in India. India infrastructure report, 2011, 70-87. (at) http://www.rimisp.org/wp-content/uploads/2013/05/Paper_Tushaar_Shah-4.pdf

Shivji, I 2008. Pan-Africanism or Imperialism? Unity and Struggle towards a New Democratic Africa", Law, Social Justice & Global Development Journal 2008 (1). <http://www.go.warwick.ac.uk/elj/lgd/2008_2/shivji>

Smith 1776, Smith, A. The Wealth of Nations, 1986 edition, London, Penguin

Söderbaum, F., & Taylor, I. 2007. Micro-regionalism in Africa: Competing Region-building in the Maputo Development Corridor, United Nations University Comparative Regional Integration Studies (UNU-CRIS) e-Working Paper W-2007/6.

Söderbaum F and Taylor I, 2008. Considering Micro-regionalism in Africa in the Twenty-first Century (introductory chapter, in) Afro-regions. The dynamics of cross-border micro-regionalism in Africa (Ed Fredrik Söderbaum and Ian Taylor), Nordiska Afrikainstitutet

South Africa 1970. Commission of Enquiry into Water Matters (1970) Report of the Commission of Enquiry into Water Matters, Pretoria: Government Printers.

Starr P, 2003. The People's Highway: Past, Present and Future Transport on the Mekong River System. Mekong Development Series No. 3. Mekong River Commission, Phnom Penh

Suhardiman et al. (2012). Diana Suhardiman , Mark Giordano & François Molle (2012) Scalar Disconnect: The Logic of Transboundary Water Governance in the Mekong, Society & Natural Resources: An International Journal, 25:6, 572-586, DOI: 10.1080/08941920.2011.604398

Swatuk, L. A. (2005). Political challenges to implementing IWRM in Southern Africa. *Physics and Chemistry of the Earth, Parts A/B/C*, *30*(11), 872-880.

Swyngedouw, E. (1999). Modernity and hybridity-The production of nature: water and modernisation in Spain. *Annals of the association of American Geographers*, *89*(3), 443-465.

Tarschys Daniel, 2003. Reinventing Cohesion. The Future of European Structural Policy, Swedish Institute for European Policy Studies, Stockholm.

Thiel Andreas, 2013. Towards understanding the scalar re-organisation of natural resource governance: Factors derived from water governance in Spain, Portugal and Germany, (presented at) 53rd Annual Meeting of GEWISOLA (Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues) “Wie viel Markt und wie viel Regulierung braucht eine nachhaltige Agrarentwicklung?“ Berlin, 25.-27. September 2013 (accessed at) http://ageconsearch.umn.edu/bitstream/156967/2/C1-Thiel-Towards_c.pdf

Tinbergen, J. (1954). International economic integration,. Amsterdam: Elsevier.

Toonen, T. A., & Hendriks, F. (2001). *Polder Politics: The Re-Invention of Consensus Democracy in the Netherlands*. Ashgate

Tortajada, Cecilia (2014) IWRM revisited: from concept to implementation, International Journal of Water Resources Development, 30:3, 361-363, DOI:10.1080/07900627.2014.937085

TRADES 2013. Trade & Development Studies (TRADES) Centre, Draft report of the independent midterm review of the Regional Indicative Development Plan 2005-2012, (prepared for) SADC, TRADES, Harare.

TRALAC 2014. Trade Law Centre, Shaping a 21st Century Trade Integration Agenda for Africa , SADC Summit TRALAC Trade Brief, August 2014

Trenz, H. J. (2014). The Saga of Europeanisation. ARENA Working Paper 7/2014, ARENA Centre for European Studies, University of Oslo, Norway

Tsakalidou I, 2013. The Great Anatolian Project Is Water Management a Panacea or Crisis Multiplier for Turkey’s Kurds?, New Security Beat, Environmental Change and Security Program, Woodrow Wilson International Center for Scholars (accessed at) http://www.newsecuritybeat.org/2013/08/great-anatolian-project-water-management-panacea-crisis-multiplier-turkeys-kurds/

Turral H, Connell D and McKay J, 2009. Much Ado about the Murray: the Drama of Restraining Water Use, (in) River Basin Trajectories: Societies, Environments and Development (eds Molle and Wester), CAB International.

TVA 2005, Energy Vision 2020, Volume 2, Technical Document, Existing Power System, TVA.

TVA 2014. Tennessee Valley Authority, TVA on the New Frontier (accessed at) http://www.tva.gov/heritage/jfk/

UN 1965. Convention on Transit Trade of Land-locked States, United Nations, New York

UN (United Nations) 1972. Declaration of the United Nations Conference on the Human Environment , Stockholm, 1972 http://www.unep.org/documents/default.asp?documentid=97&articleid=1503

UN (United Nations) 1977, Report of the United Nations Water Conference, New York, 1977. Not available on the UN website but found at http://www.ircwash.org/sites/default/files/71UN77-161.6.pdf (accessed May 2014)

UN 1982. United Nations Convention on the Law of the Sea (UNCLOS III)

UN 1992. Conference on Environment and Development, Agenda 21: Programme of Action for Sustainable Development. *United Nations Department of Public Information, New York*.

UNECA 2015. History & Background of Africa's Regional Integration Efforts | United Nations Economic Commission for Africa (accessed at) http://www.uneca.org/oria/pages/history-background-africas-regional-integration-efforts

UNECE 1992. Convention on the Protection and Use of Transboundary Watercourses and International Lakes, United Nations Economic Commission for Europe (UNECE).

UNECE 2007, Terms of reference of the UNECE Committee on Environmental Policy, as approved by the Economic Commission for Europe at its 62nd session, http://www.unece.org/env/cep/tor.html

UNECE 2014, Mission of the United Nations Economic Commission for Europe (accessed at) http://www.unece.org/termsofreferenceandrulesofprocedureoftheunece.html) September 2014

UNEP 2003. Analysis of Reactions on the World Commission on Dams Report, Interim Report. Dams and Development Programme (DDP) secretariat, United Nations Environment Programme, Nairobi.

Uprety Kishor, 2006.The Transit Regime for Landlocked States: International Law and Development Perspectives, The World Bank, Washington DC, pp. 66-75.

USA 1902, The Reclamation Act, Washington DC

USA 1981. Executive Order 12319--River basin commissions, Washington.

USA 2005. USA Embassy in Maputo, PORTUGAL TO TRANSFER CAHORA BASSA DAM TO MOZAMBIQUE, Unclassified telegram of November 4 to Secretary of State and US embassies in Lisbon and to SADC (accessed at) http://www.wikileaks.org/plusd/cables/05MAPUTO1449_a.html

USACE 2009. Mississippi River Commission (in) Report of the Secretary of the Army on civil works activities for FY 2008, US Army Corps of Engineers, (p41-1 – 41-109), Washington.

USACE 2014, Mid-Atlantic River Basin Commissions (accessed at) http://www.nab.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/10470/Article/492811/mid-atlantic-river-basin-commissions

Varsamidis A. An assessment of the Water Development Project (Gap) of Turkey: meeting its objectives and EU criteria for Turkey's accession. MA Thesis, Naval Postgrad School, 2010. Available at: http://edocs.nps.edu/npspubs/scholarly/theses/2010/ Dec/10Dec_Varsamidis.pdf. (Accessed September 2014)

Vaz AC 2000. Coping with floods – the experience of Mozambique, (presented at) WARFSA/WaterNet Symposium: Sustainable Use of Water Resources, Maputo, 1-2 November 2000 (accessed at http://10.2.1.2:2111/usg/NdxICC.htm?IP=10.2.1.2&MA=00DBDF0B35C9&OS=http://ipcc-wg2.gov%2Fnjlite_download.php%3Fid%3D6931)

Vink N, 2011. Regional opportunities for agricultural specialisation and trade (presented at) workshop on Regional Approaches to Food and Water Security in the Face of Climate Challenges, DBSA, Midrand.

Warleigh-Lack, A., (2006). "Towards conceptual framework for regionalisation: Bringing New Regionalism and Integration Theory" in Review of International Political Economy, Vol. 13(5) p.750-771

Warner et al. 2014. Jeroen F. Warner, Philippus Wester and Jaime Hoogesteger, Struggling with scales: revisiting the boundaries of river basin management WIREs Water 2014, 1:469-481. doi: 10.1002/wat2.1035

WCC 1971. World Council of Churches. Programme to Combat Racism. *Cabora Bassa & the Struggle for Southern Africa*. World Council of Churches

Wester, P., Rap, E., & Vargas-Velázquez, S. (2009). The hydraulic mission and the Mexican hydrocracy: Regulating and reforming the flows of water and power. *Water Alternatives*, *2*(3), 395-415.

Wittfogel, K. A. (1957). Oriental despotism: A comparative study of total power. New Haven: Yale University Press.

World Bank 2011. The Zambezi River Basin, A multi-sector investment opportunities analysis summary report, World Bank, Washington

World Bank 2012. Directions in Hydropower, World Bank, Washington

World Bank 2013. Strengthening support for regional projects – background note, IDA Resource Mobilization Department (CFPIR), Washington.

World Council of Churches. Programme to Combat Racism. (1971). Cabora Bassa & the Struggle for Southern Africa. World Council of Churches

WMO 2011. World Meteorological Organization, Comprehensive Review of WHYCOS (the World Hydrological Cycle Observing System), WMO:Geneva.

WWAP (United Nations World Water Assessment Programme), 2009. The United Nations World Water Development Report 3. Earthscan.

WWAP (United Nations World Water Assessment Programme), 2014. The United Nations World Water Development Report 2014: Water and Energy. Paris:UNESCO.

Zambian watchdog 2010. Zambia refuses to share Zambezi water with other countries, (accessed at) http://www.zambianwatchdog.com/zambia-refuses-to-share-zambezi-water-with-other-countries/

ANNEX 1

TERMS OF REFERENCE FOR A DIRECTED WRC PROJECT KEY STRATEGIC AREA

KSA 1

THRUST 1: Water Resource Institutional Arrangements

PROGRAMME 4: Transboundary water resources

TITLE

Water's role in driving regional economic integration in Southern Africa

Objectives:

General: To examine the role of water as a driver of regional economic integration in Southern Africa

Specific:

1. To investigate water's role in regional integration in the following dimensions:

a. The way in which water is addressed in institutional arrangements such as regional economic communities (RECs) (SADC, SACU, COMESA, EAC, as well as the SADC-EAC-COMESA Tripartite Alliance); and river basin organizations (RBOs). What lessons can be drawn from the way in which water is addressed in traditional RECs, and applied within the new Tripartite Alliance?

b. Water as an engine for regional integration and socio-economic development.

c. Water as a constraint to regional integration and what the potential solutions may be.

2. To explore how economic dynamics related to commodity production cycles generates new regions, such as for water, minerals and energy. This objective is also related to the link between water and the mandate of RECs i.e. how water helps or hinders the development of the mining industry and its implications for regional trade.

Rationale:

The growing international consensus on the need for transboundary cooperation is regarded as the genesis of collective action at the regional level (GWP 2010). Today, it is well-known that cooperative arrangements are increasingly moving away from a single focus on sharing waters in terms of volumetric allocations to the sharing of multiple benefits derived from more optimal water arrangements within basins. This suggests that future transboundary water governance frameworks need to include a 'future politics' of synergized decision-making that adopts a broad and integrative approach to regional integration and socio-economic growth (GWP 2010). Central to this is the long-term policy challenge of linking processes of regional economic cooperation to country-level and/or basin-level water management and vice versa (GWP 2010).

International river basins are increasingly important as development drivers in Southern Africa. Their huge resource potential in agriculture, energy production and other sectors is well known. However, despite these and many other inherent interlinkages, transboundary water management has not featured as an integral part of the economic integration discourse, although this is slowly changing. This is largely due to the fact that this agenda has been driven by RBOs whose mandate is only to advise member states and not drive any economic integration agenda. Added to this is the fact that

overlapping membership to several RECs and the multiplicity and changing nature of such memberships by nation states ensures that river basins are part of an increasingly complex landscape of institutions, policies, trading relations and sectoral demands. The relevance of the existing institutional complexity presents challenges but also opportunities for sectors that are directly or indirectly involved with water issues to increasingly integrate in terms of decision-making in agriculture, energy, industry and urban development in particular.

The focus of this project is therefore to examine existing RECs (SACU, SADC, COMESA, EAC) as well as new regional economic instruments (such as the SADC-COMESA-EAC Tripartite Alliance) in Southern Africa from a water governance perspective. A second and equally important focus is to explore new topics, including how economic dynamics related to commodity production cycles generates new regions, such as for water, minerals, energy, oil, coffee etc. These two focus areas provide the foundation for three types of comparative studies. Firstly, a comparative analysis should be conducted on the actors, institutions, processes, and implications with regard to water of regional economic integration initiatives. Secondly, a comparative analysis of regionally tailored economic arrangements explicitly designed to support environmental governance is needed. And thirdly, an analysis of new economic regionalism in the form of commodity regions, and specifically, the role of water in this landscape should be conducted.

There is therefore a need to understand the role of transboundary waters in promoting regional integration by providing valuable services such as energy production; primary products; industry and domestic water use; and ecosystem services. An important discussion to have in this regard relates to the type of institutions that are most appropriate to deal with this reality. Are water-centric institutions such as RBOs in fact the most appropriate vehicles through which to channel development strategies? Water-centric institutions do not (and should not) operate in a vacuum. They are an important piece (one of many) of the puzzle in dealing with natural resource governance and development but will have to work with other sectors and multi-level institutions to address root causes of problems and issues.

Additionally, how is national sovereignty affected? Are countries willing to give up some level of control for regional development? Additionally, why are we pushing better water governance at the regional level? The justification for the need to explore alternative models of water governance (regional approaches, multi-level approaches) stems from the concern with increasing transaction costs of global regimes and the resultant “global convention fatigue.” These concerns are producing a shift in the locus, impetus, implementation, and innovation to regional levels. Additionally, the theoretical applicability of alternative approaches relates to the observation that studies of regional politics now require an expansion beyond traditional preoccupations with economic integration and security cooperation, to areas of environmental security and sustainable development. Essentially, in this project, we have to interrogate this hypothesis. Are regional arrangements really better?

In addressing these and other water governance challenges, and advancing the understanding of alternative approaches, important research questions deserve further investigation. These relate to the emergence and manifestation of regions from the environmental perspective; the evolution, desirability, effectiveness, and efficiency of regional environmental governance; the applicability and role of existing regional institutions in addressing environmental challenges in addition to economic and socio-political realities; relationships within, among, and beyond regions in multi-level arrangements; and the repercussions of regional water governance for democratic legitimacy, accountability, and transparency. In essence, global change necessitates the exploration of new and alternative approaches to the way we govern natural resources.

Deliverables:

1. Literature Review of water's role in regional integration drawing on international best practice and regional experience.

2. Comparative Analysis of the actors, institutions, and processes of regional economic integration and their interface with water.

3. Comparative Analysis of regionally tailored economic institutional arrangements explicitly designed to support water governance.

4. Analysis of new economic regionalism in the form of commodity regions, and specifically, the role of water in this landscape.

5. Final Report.

Impact Area:

Water and political economy

Time Frame:

April 2013 – March 2015

ANNEX 2:

INTERVIEWEES (PARTIAL)

NAME	ROLE	INSTITUTION
Bai Mas Taal	Exec Sec	AMCOW
Afrika, Jean-Guy	Snr Trade Policy Analyst,	AfDB
Ahmed, Sheikh Jaued,	Chief WR Engineer	AfDB
Jallo, Sering,	Director, OWAS/AWF	AfDB
Lonsway, Kurt.	Manager, Environment and Climate Change Division	AfDB
Mizrahi, Simon.	Director, ORQR	AfDB
Olaye, Ralph A.	Manager, Regional Integration & Trade	AfDB
Rugamba, Alex.	Director, Regional Integration & Trade	AfDB
Baboucar Sulay	Regional Director EARC	AfDB
John Sifuma, AfDB OWAS	Water specialist	AfDB
Tom Roberts	Water specialist	AfDB
Dr Tilahun Temesgen	Chief regional economist EARC	AfDB
Lamin Manneh	Chief regional integration officer EARC	AfDB
Sheikh Javed Ahmed	Chief WR Engineer EARC	AfDB
Akari, Peter,	Chief Water Policy Officer	African Water Facility
Akissa Bahri,	Coordinator, AWF	African Water Facility
Hoess, Sonja.	Water Financing Expert	Infrastructure Consortium for Africa
Teferra Beyene, Executive	Director	Nile Basin Initiative
Dr Abdulkarim H Seid	Head, Water Resources Management	Nile Basin Initiative
Juliet Mwanagga	Head, information centre	Nile Basin Initiative
Simon Thuo	Consultant, former coordinator	Nile Basin Dialogue
Telly Eugene Muramira	Dep Exe Sec – Projects & Programmes	Lake Victoria Basin Commission
Dan Oduor Owore	Regional Programme Coordinator	LVBC
Omari Mwinjaka	Water resources mgmt. officer	LVBC
Lenka Thamae	Exec Sec	ORASECOM
Michael Mutale	Exec Sec	ZAMCOM interim sec.
Eben Chonguica	Exec Sec	OKACOM
Phera Ramoeli	Senior Programme Officer – water	SADC
Kenneth Msibi	Programme Officer – water	SADC
Freddie Motlhatlhedi	Director a/i Infrastructure and Senior Programme Officer – energy	SADC
Odala Matupa	Programme Officer – energy	SADC
Jonathan Mayuyuka Kaunda	Head, research, policy and strategy development, PPRM	SADC
Jesca Eriyo	Deputy SG (productive sectors)	East African Community
Timothy Wusonga	Senior Natural Resources officer	East African Community
Sekgowa Motsumi	District Head, Okavango Delta Management Programme	Botswana Department of Environmental Affairs
Tracy Molefe	International rivers officer	Botswana Water Affairs
Alex Mwanologo	AfDB programme coordinator	Kenya, Ministry of Water
John Rao Nyaoro	Director Water Resources	Kenya, Ministry of Water and Irrigation

Professor George Krhoda	Former PS-Water, Kenya	Nairobi University
Lindiwe Lusenga	DDG, International	SA Dept of Water Affairs
Rejoice Mabudhafasi	Deputy Minister	SA Water and Env Affairs
Trevor Balzer	Acting DG	SA Water and Env Affairs
Nick Tandi	Water coordinator	SA Strategic Water Partners Network
Godfrey Mwiinga	Sector expert	DBSA
Nic Opperman	Director, natural resources	AgriSA
Andre Liebaert,	Water Policy Off., DG-Dev, EuropeAid	European Commission
Nicole Kranz	Water stewardship advisor	GIZ
Malte Grossmann	Coordinator, global TB water program	GIZ
Winfried Zarges,	Sector Mgr, AU Office, Addis Ababa	GIZ
Gustavo Saltiel,		CIWA/World Bank
Jacqueline Tront	Snr. water resources specialist	CIWA/World Bank
Anton Earle		SIWI
Dr Amy Sullivan	Prog Mgr: nat res & environment	FANRPAN
Prof Philip Woodhouse	Lead, Komati river project	University of Manchester
Patricia Wouters	TEC member	GWP-TEC
Trudy Hartzenberg	Director	TRALAC
Gerhard Erasmus		TRALAC

ANNEX 3:
ABBREVATIONS

AEC	African Economic Community
AfDB	African Development Bank
AIM	Mozambique News Agency
ASEAN	Association for South East Asian Nations
AU	African Union (successor to the OAU)
CCNR	Central Commission for Navigation on the Rhine
CIS	Commonwealth of Independent States
CIWA	Cooperation in International Waters in Africa
CO2	Carbon dioxide
COMESA	Common Market for Eastern and Southern Africa
CRIDF	Climate Resilient Infrastructure Development Fund
CVCE	Centre Virtuel de la Connaissance sur l'Europe
DBSA	Development Bank of Southern Africa
DFA	Department of Foreign Affairs
DRBC	Delaware River Basin Commission
DRC	Democratic Republic of the Congo
DSI	General Directorate of State Hydraulic Works, Turkey
DWA	Department of Water Affairs (South Africa)
EAC	East African Community
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ECOSOC	Economic and Social Council
EDM	Electricidade de Mocambique
ELMS	Environment and Land Management Sector
ENGOs	Environmental non-governmental organisations
ESKOM	Electricity supply commission
EU	European Union
FAO	Food and Agriculture Organisation
Frelimo	Frente de Libertacao de Mocambique
FTAs	Free Trade Agreements
GAP	Great Anatolian Project
GDP	Gross Domestic Product
GDP PPP	Gross domestic product at purchasing power parity
GEF	GlobalEnvironment Facility
GIZ	Gesellschaft für Internationale Zusammenarbeit
GW	Gigawatts
GWh	Gigawatt Hour
GWP	Global Water Partnership
HCB	Hidrelectrica Cahora Bassa
HYCOS	Hydrological Cycle Observing System
ICAS	Interstate Council for the Aral Sea
ICRP	International Commission for Protection of the Rhine
ICTs	Information and Communications Technologies
ICWC	Inter-state Commission for Water co-ordination
ICWE	International Conference on Water and the Environment
IEA	International Energy Agency
IESE	Institute of Social and Economic Studies
IFAS	International Fund for Saving the Aral Sea
IRENA	International Renewable Energy Agency
ITF	International Transport Forum
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
IWRD&M	Integrated Water Resources Development and Management
IWRM	Integrated Water Resources Management
KOBWA	Komati Basic Water Authority
LAWA	Länderarbeitsgemeinschaft Wasser
LHWP	Lesotho Highlands Water Project
LIMCOM	Limpopo Watercourse Commission
LUSIP	Lower Usuthu Irrigation Project
MDB	Murray Darling Basin
MDGs	Millennium Development Goals
Mercosur	Mercado Común del Sur
Mha	Million hectares (?)
MRC	Mekong River Commission
MTR	Mid-term review

NATO	North Atlantic Treaty Organisation
NGOs	Non-governmental Organisations
NPC	(South African) National Planning Commission
OAU	Organisation for African Unity
OECD	Organisation for Economic Cooperation & Development
OEEC	Organisation for European Economic Cooperation
OKACOM	Okavango Watercourse Commission
ORASECOM	Orange-Senqu Watercourse Commission
PKK	Worker's Party of Kurdistan
RAP	Rhine Action Programme
RBOs	River Basin Organisations
REC	Regional Economic Communities
RFP	Request for Proposals
RIDMP	Regional Infrastructure Development Master Plan
RISDP	Regional Indicative Strategy Development Plan
SACU	Southern African Customs Unions
SADC	Southern African Development Community
SADCC	Southern African Development Coordinating Conference
SAP	Strategic Action Programme
SAPP	Southern African Power Pool
SARDC	Southern Africa Research and Development Centre
SWCLU	Soil and water Conservation and Land Utilisation
TRADES	Trade & Development Studies
TRALAC	Trade Law Centre
TVA	Tennessee Valley Authority
TWh	Terawatt hour
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UN-ESCAP	United Nations-Economic and Social Commission for Asia Pacific
UNESCO	United Nations Educational Social and Cultural Organisation
USACE	United States Army Corps of Engineers
USSR	Union of Soviet Socialist republics
WCD	World Commission on Dams
WISA	Water Institute of Southern Africa
WMO	World Meteorological Organisation
WSSD	World Summit on Sustainable Development
WWAP	World Water assessment Programme
WWC	World Water Council
WWF	World Wildlife Fund
ZACPLAN	Zambezi section plan
ZAMCOM	Zambezi Watercourse Commission
ZAMWIS	Zambezi water information system
ZRA	Zambezi River Authority