

**TRANS-BOUNDARY AQUIFER WATER CRISIS: CHALLENGES AND
POLICY IMPLICATIONS FOR SOUTHERN AFRICAN REGION**

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Abstract

The supplies of fresh water are dwindling creating conflict among competing users of this resource. Its quality is corrupted by contamination. The growth in population, urbanization and industrialization are increasingly fierce competition for this depleting resource among its incompatible users. The climate change has increased water stress. Increase in agricultural land under irrigation has demand for more water. In Southern Africa countries will resort to subterranean water to meet their diverse needs. The nature of underground water's geophysics and lack of data thereof in the region, the lack of ground water regulations governing its abstraction on the boundaries, is likely to cause conflicts. This paper looks at the implications of abstraction of the trans-boundary aquifer water on policy. The paper points to the current weaknesses of the regulations due to inadequate data on the quantity and spatiality of this resource and proffer for the need of resilient institutions that can work as instruments of conflict resolution. Secondary literature is used to demonstrate the levels of the underground water problems and the attending tensions. It is concluded that while water cannot bring violent conflict in the near future between nations, the distant conflict will be based on 'water cannons and steel bullets'. This can be resolved by shared regional understanding of the vulnerability of water and creation of resilient policies implemented by all stakeholders.

Introduction

There has been a growing awareness that fresh water supplies are becoming scarce and limited in human activities (Ashton 2000:1). Water resources –their scarcity, distribution and quality-have been named as the factors likely to lead intense political pressures (Wolf et al 2003). Water resource users at all scales frequently find themselves in direct competition for this economic and life sustaining resource, in turn creating

tensions, and indeed conflict, over water supply, allocation and quality (Giordano and Wolf 2003). Tensions are accentuated by widespread population growth, as well as increased rates of urbanization and industrialization (van Wyk, 1998, McHugh 2005) and increasingly fierce competition for this depleting resource among incompatible users. Postel (1999) says water is central to human life: unlike other scarce resources, it is used to fuel all facets of society. It is integral part of the ecosystems and since it flows, use of a river or aquifer in one place will affect its use in another distant place. Within the watershed everything is connected: surface water, ground water, quantity and quality (Wolf et al 2005). Likewise water is both an irritant and unifier (Parker 2006). Because it moves through the hydrological cycle it is self-cleansing, human communities have come to assume that water is inherently pure and abundant to the extent of being careless and the same water has gone untreated and unprotected (Parker 2006).

Water ownership, management and use are the most likely critical problems to confront the Sub Sahara Africa. The region faces economic water-scarcity (OECD 2005). Soon the water problems will be 'interwoven with deep-seated political, demographic, economic and even religious conflicts' (Morris 1997). Increased crop failures, unilateral utilization of water, reduced water flows, salinization, constraints on irrigation, pollution, etc. coupled with unresolved border issues, massive population increases and diminishing agricultural resources, is likely to cause frictions between countries sharing a riparian system in Africa. Certainly water will become a political weapon and a bargaining tool. It is likely that in the event of violent conflicts armies will poison rivers and wells, salt the earth, and destroy crops (Morris 1997). Water will become a legitimate target and a

source of friction between regional states and militarization of water conflict will occur. Ceasing to be the surrogate issue (Ibid.), water will become the motive for conflict.

Southern Africa is generally an arid to semi-arid region. Supplies of fresh water are finite and the existing demands for water in some parts of the region are fast approaching the limits of exploitation that conventional technologies can provide (SADC-ELMS, 1996). Regional states will rush to exploit water reserves at located at the borders be they rivers or aquifers to cater for their ever-thirsty demands. This exploitation of trans-boundary aquifers between Southern African countries is likely to instigate crises than have been in the past. Yet there is unknown number of trans-boundary aquifers (Giordano and Wolf 2003) nor the quantities of water there of.

In vulnerable regions of Sub-Sahara Africa, due to dire climatic conditions and political tensions, shared water supplies have high risk of conflict. The conflicts are likely to be motivated in 'respect to trans-boundary movements where institutional capacity and international law are in the initial stage of formulation (Jarvis et al 2005). As the 'race to the pump' increases and designer water companies plan to export ground water over vast distances for pecuniary gains, conflicts will become frequent among affected nations. These conflicts will be driven by the hidden nature of ground water and lack of international law governing shared aquifers (Ibid.). This uncertainty requires rethinking of ground water management as the intensity of development increases apace with the need for food security. The use of common property theory will no longer be sufficient to develop general principles of ground water management (Ibid.). It follows that there are no treaties in Africa at the moment governing the abstraction of water from shared

aquifers in trans-boundary systems. Traditional conflict resolution as a result will be difficult and may require other approaches.

The Challenges and Management of Water Crisis between States

Countries in the Sub Sahara Africa are increasingly experiencing droughts of such severity that they have caused food shortages and threatened food supply. Climate changes are producing erratic weather resulting in similar crises. Each member state endeavors to increase the size of land under crops and capture water for the diverse requirements given these threatening climate changes. The reports of diminishing and degraded fresh water resources have come to lead into environmental stresses threatening water and traditional security and national sovereignty.

The international water basins are strongly tied to a deepening global water crisis with loss of ground water storage exemplified by falling ground water levels in wells, surface and ground water increasingly becoming contaminated, and water delivery and treatment infrastructure aging (Jarvis et al 2005). Shortages of water, degradation of its quality and destruction of water ecology negatively impacts on the sustainable socio-economic development and political stability. As for the use of water in rivers there are more than 3600 treaties in place signed between 1805 and 1984 (Ibid.). As of ground water there are few states that have water laws that address ground water management due to the invisible nature of the resource or the technical skills for predicting the spatial and temporal changes in ground water (Ibid.). More so the international law does not

adequately define ground water, much less its spatial flow (Ibid.). There are no guidelines assisting nations in management and allocation of subterranean water. This leads to competitive exploitation of water without minimizing net losses from the hydrologic reservoir (NGWA 2004). Where there are laws, trans-boundary aquifers are usually addressed in cursory, poorly defined manner due to lack of consensus regarding applicable international law and agreements on underground water. Given lack of consensus on what underground water is, conflicts over quantity and quality of water are likely to emerge with the increased reliance on this underground water for drinking, agriculture and industrial use. Issue of groundwater pumping has attracted little official scrutiny in regard to trans-boundary impacts. Knowledge is also scarce about groundwater availability, physical dynamics of aquifers, quality of water and levels of pollutants, as well as other characteristics of the groundwater in the border region (McHugh 2005). Where the valuable asset of knowledge lacks about the quantity of subterranean water on the boundary, its abstraction will cause serious tensions.

The flow of ground water across geopolitical boundaries in an unpredictable manner due to barriers imposed by faulting, fractures or basin switches would create additional problems for policy and conflict resolution. Water systems cross-political boundaries, causing difficulties in forming a complete picture of those resources. Monitoring, mapping, and quality testing of both surface and groundwater is important, but complicated (ibid.). Limited understanding of recharge mechanisms and subsurface flow regime will provide additional challenges. There is no known rate of recharge in the shared aquifers creating holes and inconsistencies in the national data. The open access and competition that ensues in the process of abstraction without achieving fairness may

lead to misunderstandings between those that share the common aquifer. Water related conflict may occur when 'states refuse to participate or cooperate in regional mechanisms designed to assure water security for all parties (APCSS 1999).

Traditional systems and international law and treaties are proving that they lack provisions, experience or skill in dealing with this kind of conflict. In place of the traditional and international water treaties governing international basins, what other mechanism can be used to transform conflicts should they happen between states? To manage border water resources in a sustainable fashion is by no means easy (McHugh 2005). I propose the Transcend way as the ideal and almost akin to the traditional win-win approaches inherent in Africa. The transcend approach was developed by Johan Galtung.¹ It takes into account all goals, all parties, issues and forgotten parties with stakes into the conflict and develop acceptable goals in all parties. The involvement of forgotten parties may bring new perspectives and help at arriving on over-arching goals acceptable to all parties. Treaties and agreements have a tendency of missing these dimensions and end ignored by unilateralists, as a result conflicts revive.

The post-Rio period witnessed the growing commitment towards integrated water management among states sharing riparian systems. This is encouraging as it works against the possibility of violent conflicts. This also developed against a rich background of treaties concerning management of shared watercourses (Giordaino and Wolf 2003). However, on the international side, the declarations and principles governing water have remained vague and sometimes contradictory.

¹ Galtung is a Professor of Peace Studies at American, Ritsumeiken, Tromso, Witten/Herdecke Universities and Director of TRANSCEND

History of water management dates back as 2500 BC when a treaty ended a true ‘water war’ (ibid.). Food and Agricultural Organization (FAO) identifies more than 3600 between AD 805 and 1984 (FAO 1984). It is important to note that most of these treaties were mainly concerned with navigation of watercourses, to non-navigational issues of generation of hydro-power, flood control.

Despite there growing in number these treaties were lacking in robustness (Giordano and Wolf 2003). These accords did not clearly delineate clearly water allocation, for instance. In some cases they ignored changing values and needs and hydrologic variations. Historically water quality has played a major role in these treaties. However, nations have been able to share information, monitoring and instruments of conflict resolution (ibid.).

There are traditional approaches that have been applied to solve water crises that have worked. The Hammurabi’s code (Genesis 26:19-22) has been used to arbitrate water issues in the biblical times. The most developed traditional approaches to water crises are found in the particularly desert communities in the Middle East due the extended scarcity of water for human and animals. In the tropical countries the level of scarcity has been very tolerable to the extent that water was not considered an issue befitting policy consideration between nations. Water has been viewed in abundance with capacity of self-renewal. Unlike minerals and other resources that deplete, countries have never considered water as a resource with capacity to deplete due to drying up of rivers, springs, lakes, seas, lowered subterranean water tables, due to contamination, and vanishing of wetlands. The pressures of climate change have brought the importance of water to the fore. In Southern Africa debates are raging on how best to safe guard the

retreating resource. However, there is little attention paid on the underground water particularly in reservoirs that transverse the frontiers of states. But for shared river basins like the Zambezi treaties and joint commissions that are resilient exist to deal with issues arising out of the need to use the shared water.

Policy Implication

Public policy can be viewed as an authoritative statement of who gets what, when and how? The determination of those affected by a policy is made by an authority vested with power to do so. In a democracy it can be an elected parliament, local authority or individuals as in a dictatorship. Policies therefore have limited application to as far as the confines of geography of a country. Policies have no trans-boundary application. Conventions, treaties or pacts cater for this.

Southern Africa region has no treaties or conventions governing the abstraction of underground water. In fact there is no adequate data about the spatiality, quantities, recharge and switching abilities of the shared subterranean water. Yet underground water is becoming the last option in the depleting water levels in dams and increasing droughts and famines.

As an answer to increasing questions about the availability and usage of underground water in the region, serious research must be carried out within nations and between nations about the quantity, quality and depth of subterranean water reservoirs on the frontiers. The aquifer complexes that have the potential to cause problems should be mapped using GIS to determine the water quantities, depth, and the abstraction potential. These will be used in designing intervention mechanisms countries in conflict can use.

In the areas where some data is available about the nature and availability of this water, the available joint water commissions must be capacitated to deal with arising underground water problems affecting member states collectively. Yet member states tend to treat this data as part and parcel of their national security and cannot be shared. In coming up with mechanisms to manage underground water, national governments must involve all stakeholders, from farmers, industries, local leaders, rainmakers, citizens and water companies. Water barons with narrow interests in water must be managed. Comprehensive regulations transcending persons and nations will function as conflict resolution mechanism. In this regard states should desist from the commercialization of public administration by putting the implementation of water policies in the hands of profit driven entities (Parker 2006).

Shared positions concerning the abstraction of underground water by all will have positive down stream effects at national level. Water will not suffer the tragedy of the commons, but will benefit from responsible use by the citizens of the region. This is effectively made possible by allowing local control or public right to input in management practices. To achieve this local participation, a model by John Paul Lederach that is used for both water management and conflict resolution is suggested. In comprehensive three tier system, the top leadership (Level One), the political, religious and military leadership work with their counterparts to stabilize the situation, the Level Two leadership in academia, NGOs, or ethnic groups educate the citizens about the water crisis, and Level Three leadership at the grassroots level implement the water policies and their best ideas for creating and managing citizen water systems must be solicited (Parker 2006).

Conclusion

I conclude that for the trans-boundary water management to work effectively, a 'rock solid distribution program needs to be place. This program must be able to return control of water resources to local people where it is most effective and fair. Idealization of privatization of water should not be taken wholesomely. In this regard the need to properly value water for all sectors is crucial to reduce conflicts based on the abstraction of underground water. A regional data bank on the nature and availability of this water needs to be created and funded with an understanding that water can act both as an irritant and a unifier. Regional water policy will help against its dehydration and stem possible conflicts in future.

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