

**Reform process and performance analysis in water governance and management:  
A case of study of Inkomati Water Management Area in South Africa**

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## **Abstract**

In 1994, South Africa changed its political system from apartheid to democratic regime. In the spirit of the new democratic dispensation post 1994, South Africa's National Water Act (NWA) was enacted in 1998. One of the purposes of the 1998 NWA was the decentralization of water resource management at most appropriate level. Under the 1998 Water Act, the country was divided into nineteen Water Management Areas (WMAs). One of the WMA created under the 1998 NWA is the Inkomati Water Management Area (IWMA). However, the pace and outcome of the decentralization process in South Africa's water sector and in particular in IWMA since 1998 have not been satisfactory to many stakeholders. This study aims to understand the water reform process in Inkomati Water Management Area (IWMA) by evaluating the factors that impact the outcome of decentralization process and performance using a case study approach. Under this method, collected data are compared and contrasted with the hypotheses made in the literature about the impact of selected variables on the river basin decentralization process and performance. The results indicate that the creation of IWMA and its sub catchments and the engagement of river basin stakeholders contribute positively to the creation of a decentralized river basin. However, dependency on donors and government funds, the lack of involvement of basin level organization (ICMA and its sub catchments) in collecting water tariffs, power imbalances among basin stakeholders are limiting factors for the decentralization process and performance.

*Key words:* Decentralization process and performance, DWAF, ICMA, IWMA, NWA

## 1 Introduction

Due to scarce world water resources, conflicts have arisen among different interest groups in river basins and the potential for escalated conflicts still exists (WBI, 2006). This observed phenomenon is prevalent in South Africa, whose land dispensation since 1913 promoted a skewed distribution and management of the country's natural resources. This meant that there was inequality in accessing and using of natural resources like land and water. For example whites in South Africa held large amount of land and possessed rights to use the water resources that were found on their land for their corporate and social activities. On the other hand, most of the black population was settled on marginal land with low natural resource endowments. In 1996, it was estimated that 40% of the people (approximately 16 million) in South Africa did not have access to clean water for domestic chores and approximately 21 million people did not have sufficient water for sanitary needs (Pienaar & van der Schyff, 2007).

Additionally, the apartheid policies and institutional arrangements were designed in such a way that they perpetuated discrimination in capturing the benefits that were associated with land and water. However, in 1994 South Africa changed its political regime from the apartheid system to that of a democratic dispensation. In the spirit of the new democratic dispensation post 1994, South Africa's National Water Act (NWA) was enacted in 1998. The purpose of the 1998 NWA was to ensure that the nation's water resources are "protected, used, developed, conserved, managed and controlled" in ways that would take into account among other things: "meeting human basic needs of present and future generations, promoting equitable access to water, redressing the results of past racial and gender discrimination"(RSA, 1998).

According to Pegram et al. (2006), the fundamental principles set out above are to be achieved through the creation of Catchment Management Agencies (CMAs) at the most appropriate level (river basin) that will be guided by the National Water Resource Strategy (NWRS) and more locally by the establishment of Water Users Associations (WUAs). Under the 1998 Water Act, the country was divided into nineteen Water Management Areas (WMAs)<sup>1</sup> and each WMA was to be managed by a catchment management agency (CMA). Despite more than a decade's existence of South Africa's National Water Act (NWA) of 1998, to date less than fifty percent of the nineteen proposed Catchment Management Agencies (CMAs) have been established and are not fully functional (Lotz-Sisitka and Burt, 2006). The limited functionality of the established CMAs is associated with the lack of stakeholders' engagement, which has resulted with the weak establishment of governing structures such as basin governing boards. The two CMAs that are fully operational are the Inkomati and more recently the Breed Overberg.

The new water resource management structure is based on the principle of Integrated Water Resource Management (IWRM), which gained acceptance after the International Conference on Water and Environment in Dublin in 1992. One of the main components of IWRM is decentralization of river basins management. Decentralization, as indicated in the documents proposing IWRM, means that "water should be managed at the basin scale, based on a participatory approach, involving users, planners and policy makers at

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<sup>1</sup>Crocodile (W)/Marico, Limpopo, Levhuvu/Letaba, Olifants, Nkomati, Usutu/Mhlatuze, Thukela, Mvoti/Mzimkulu, Upper-Vaal, Middle-Vaa, Lower-Vaal, Upper-Orange, Lower-Orange, Mzimvubu/Keiskamma, Fish/Tsitsikamma, Gouritz, Breede Overberg and Berg.

all levels.” Under the same principle, groups of stakeholders operate in an equivalent position to local government agencies in the decision making process. This implies that some decisions are assigned to the stakeholders, while others are kept at central, provincial or local levels of governance (Ferguson & Mulwafu, 2004 and Kemper, Blomquist and Dinar, 2005). In order to better understand the changes in the management models of water resources in South Africa, a historical overview of water legislation in South Africa is presented below.

### **1.1 A historical perspective of water legislation in South Africa**

The regulation of water use in South Africa can be divided in two distinct phases. The first phase comprises the period from 1652 to 1997. Under this period, water use in South Africa was regulated using English, Roman, Roman-Dutch Law and even American.

The second phase started with the development of White paper in 1997 (Chibwe, 2011). This paper was developed through wide consultations to different stakeholders and other water interest groups and was later summarized into legislation. As a result of the white paper, the water Act n° 54 of 1956 was replaced with the 1998 Water Act (Act n° 36). The 1998 Water Act changed the organizational structure of water sector in South Africa. The 1998 Water Act, established nineteen Water Management Areas in South Africa. Within each Water Management Area, the 1998 Water Law established progressive creation of Catchment Management Agencies (CMAs), sub catchments entities and water user associations (WUAs) as outlined in Chapter 7, Section 77.

There are two models in which a CMA in a Water Management Area (WMA) can be set up according to article 78 of the Water Act. The first option involves the minister responsible for water affairs using his/her discretion and based on recommendations from the National Department of Water Affairs and Forestry (DWAF) in line with the National Water Resources Strategy (NWRS) enact the establishment of CMAs. The second option is where, the minister acts after receiving a proposal that has been developed by stakeholders in a Water Management Areas (Mulder, 2005). The first option represents a top-down approach while the second option is representative of a bottom-up approach.

Structured under the CMA is a third tier of management: the Water Users Association (WUA). Although water user associations are water management institutions, their primary purpose, unlike catchment management agencies, is not water management. They operate at a restricted localized level, and are in effect co-operative associations of individual water users who wish to undertake water related activities for their mutual benefit (RSA, 1998).

The WUAs operate at a local level as cooperatives and are meant to replace the irrigation boards and any other local water management institution. WUAs can be newly established for specific water management tasks. In Inkomati WMA steps have already been taken to transform irrigation boards into WUAs (Waalewijn, 2005). Unlike the irrigation boards, WUAs are supposed to control all water resources and should have representation of all stakeholders in the area of operation. However, there is no clearly prescribed task division between the CMA and the WUA as yet. The 1998 Water Act was a key element on the decentralization of water management in the Inkomati Water

Management Area. This is because through the 1998 Water Act, Catchment Management Agencies and Water User Associations have been established.

## **1.2 Problem statement**

According to Segal (2009), the pace and outcome of the decentralization process in South Africa's water sector since 1998 have not been satisfactory to many stakeholders. During the institutional realignment process it was noted that the pace of establishing new organizations in South Africa's water sector is a source of concern (DWAF, 2008). An institutional review process that was recently implemented has recommended that the number of CMAs should not exceed nine countrywide instead of the 19 initially foreseen. Hence, further establishment of CMAs has temporarily stalled pending the finalization of the current review. These facts suggest that there are several factors limiting the creation of river basin organizations, the key organizational structures towards the establishment of decentralized river basin management. Thus, understanding the nature of the problems being encountered in the decentralization reform process is an area worth exploring. However, a thorough analysis of the factors that contribute for the success and failure of water management decentralization process in South Africa has not yet been conducted.

Recent studies that have been undertaken in South Africa present the organizational structure of water sector and review the policies that have been undertaken towards decentralization of water management (Backeberg, 2005; Karar, 2002; Wester, 2003). To address this gap in terms of knowledge of the water management decentralization processes in South Africa, we conducted a case study, which analyzes the factors behind the success and failure relating to these processes of decentralizing water resource management in the Inkomati Water Management Area (the South African portion of the Inkomati river basin).

## **1.3 Objectives**

The overall objective of this study is to understand the water reform process in the Inkomati Water Management Area (IWMA). The specific research objectives are:

- (i) Describe the characteristics of the Inkomati Water Management Area;
- (ii) Analyze the factors behinds the outcomes of decentralization process of Inkomati Water Management Area; and
- (iii) Assess the performance of decentralization process in the Inkomati Water Management Area.

## **2 Methodology**

Institutional economic literature reports that the outcome of decentralization process depend on mainly four institutional factors: (i) contextual factors and initial conditions; (ii) characteristics of the decentralization process; (iii) characteristics of central government/basin-level relationships and capacities; and (iv) internal configuration of basin-level institutional arrangements. Each of these factors is characterized by a set of variables. The description of these variables is presented in Mutondo et al. (2011). Specifically, in this study we qualitatively evaluate the impact of the variables under each institutional factor on the decentralization performance of Inkomati Water Management Area.

### *Data collection*

In this study, we use both primary and secondary data. Secondary data were collected from different sources such as basin and government reports as well as other published and unpublished studies. Primary data were collected using a structured questionnaire<sup>2</sup> as well as semi-structured questionnaire. For selecting respondents, this study employed a non random (purposive) sampling, which consists of selecting respondents in a deliberative fashion in order to achieve certain objectives (Prinsloo, 2008). For example, respondents with best knowledge and experience in river basin decentralization process were deliberately chosen. This technique is appropriate in case studies where a small sample composed of key informants is selected from the target population (Saunders, Lewis and Thornhill, 2007).

In the Inkomati WMA, the structured questionnaire was intended to be filled by people representing river basin organizations. In Inkomati WMA, are 25 irrigation boards, 2 water user associations and the Inkomati Catchment Management Agency (ICMA). However, the organizations disposing of the information required for the structured questionnaire is the ICMA and the Department of Water Affairs Regional Office in Mpumalanga. Hence, the structured questionnaire was filled by 3 key respondents from the ICMA and Department of Water Affairs Regional Office in Mpumalanga.

Specifically, data on river basin characteristics were obtained from secondary sources. The remaining data required in the structured questionnaire were collected from three key respondents. Based on their experience, available data and knowledge, each of the three members of Inkomati CMA and DWAF, Mpumalanga filled specific part of the questionnaire. Therefore, only one questionnaire was filled. In order to better understand the decentralization process of Inkomati river basin and the interaction among river basin stakeholders, additional interactive questions through semi-structured questionnaire were administered to 20 stakeholders. Annex I presents the affiliation of interviewed stakeholders. The data collected from the 20 stakeholders were summarized in descriptive manner and distilled in the results shown below.

### *Data analysis*

The structured questionnaire was designed to be used in a continent-wide survey where a sufficiently large sample will be analyzed through an econometric model. In this case-study, primary and secondary data do not allow a quantitative treatment. This study uses then a comparative analysis method, meaning that collected data are compared and contrasted with the hypotheses made in the literature about the impact of selected variables on the decentralization process and performance. This approach therefore does not estimate the impact of studied variables on river basin decentralization process. It rather allows describing those variables and making some hypotheses on their impact on the decentralization process. Respondents to the structured or to the non-structured questionnaire either provided factual data or expressed their knowledgeable opinion in terms of performance of the IWMA decentralization process.

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<sup>2</sup> The questionnaire is composed of five major sections, namely 1) river basin organization identification, 2) river basin characteristics, 3) decentralization process, 4) decentralization performance and 5) basin comparisons. The questionnaire is presented in Mutondo et al. (2011).

### 3 Results

#### 3.1 Characteristics of Inkomati Water Management Area

##### *Climate and vegetation*

The Inkomati Water Management Area (IWMA) is located in the north-eastern part of South Africa in Mpumalanga province and it covers an area of 28,757 Km<sup>2</sup>. The topographical features of the Inkomati Water Management Area is characterized by two distinct zones: the plateau area in the west with an altitude of 2,000 meters above the sea level and a sub - tropical Lowveld area with an altitude as low as 120 meters below sea level (Kotze et al., 2006). The climate that prevails in the IWMA is generally influenced by its topography. On average, the basin experiences cold winters with sporadic light snow on the western side and tropical climate condition in the Lowveld areas in eastern side. Statistics indicate that, the average annual rainfall can range from 400 to 1,000 mm across most of the IWMA and about 1,500 mm along the escarpment. Specifically, the western highveld areas can receive between 650 and 1,490 mm per annum of rainfall with the Lowveld in the east receiving between 350 and 1,200 mm per annum (de Lange et al., 2009). There are three main rivers in the IWMA namely, Sabie, Crocodile and Komati and three subcatchments: Sabie-Sand, Corcodile and Komati.

Regarding vegetation, in IWMA the predominant vegetation is mesic highveld grasslands in the western high-lying areas (Mucina & Rutherford, 2006). Scanty thornveld characterizes the eastern part of the IWMA with forest cover along the escarpment. In the south western part of the IWMA are found rich Coal fields where widespread mining takes place. Additionally, in the north-eastern part of the IWMA is located the Kruger National Park which is one of the most important ecological habitats of the country. There are also gold and other mineral deposits in the region of Barberton which extend in the northern direction (Basson & Rossouw, 2005).

##### *Water resources and distribution in Inkomati Water Management Area*

Table 1 below presents the recent available water balance in the Inkomati WMA. In the year 2003, the available and required water amounts in the IWMA were estimated to be approximately 839 and 1,004 million m<sup>3</sup> respectively.

Table 1: Water Balance in Inkomati WMA in 2003 (Million m<sup>3</sup>)

Supply and demand for water	Sub catchments				
	Komati- West of Swaziland	Komati- North of Swaziland	Crocodile	Sabie- Sand	Total Inkomati WMA
Total water availability	118	298	264	159	839
<i>Demand for water</i>					
Irrigation	21	222	257	65	565
Urban	2	3	35	22	62
Rural	4	6	7	4	21
Mining	0	1	23	0	24
Afforestation	23	12	42	37	114
International Requirement	0	60	49	0	109
Transfer out	109	0	0	0	109
Total water demand	159	304	413	128	1004
<b>Water balance</b>	<b>-41</b>	<b>-6</b>	<b>-149</b>	<b>31</b>	<b>-165</b>

Source: Adapted from DWAF (2004)

Looking at different sub catchments, a water deficit exists in the Inkomati Water Management Area, with particular problems observed in the Komati and Crocodile sub catchments (41 million and 149 million m<sup>3</sup>/year respectively). These results suggest that pressure on water resources exists in the Inkomati WMA. The existence of pressure on natural resources could be likely to lead to a more successful decentralization process.

Water requirements vary from one sub-catchment to another. While water requirement is about 128 million m<sup>3</sup> in Sabie Sand catchment, it is about 413 million of m<sup>3</sup> in Crocodile catchment. These variations are mainly due to differences in intensity of economic activities developed in each catchment. While agriculture demands 65 million of m<sup>3</sup> in Sabie-Sand catchment, it demands 252 million of m<sup>3</sup> in Crocodile catchment.

The demand for water also varies by sector in Inkomati WMA. Table 1 above shows that the main water user is the irrigation sector (mainly commercial agriculture) demanding about 57% of total available water in IWMA in the year 2003. Afforestation, international requirements and transfers out demanded each 11% of available water in IWMA in the year 2003. The remaining sectors demand less than 10% of available water.

#### *Infrastructures endowment in Inkomati Water Management Area*

The IWMA is endowed with water resource infrastructures (dams and canals). Some of these infrastructures such as the Inyaka Dam on the Marite River, a tributary of the Sabie River were constructed in the 1990s. The Inyaka Dam was constructed mainly to

supply the domestic and ecological water requirements along the lower Sabie River and the domestic water requirements in the Sand River sub-catchment. The full supply capacity of the Inyaka Dam is 123 million m<sup>3</sup>, and the additional yield that becomes available as a result of the construction of this dam is estimated at 58 million m<sup>3</sup>. The other most significant dams in the Inkomati WMA are the Vygeboom, Nooitgedacht Maguga, Driekoppies and Kwena.

### *Population and economy of the Inkomati Water Management Area*

The IWMA has a population of approximately 2,208,771 people who directly or indirectly benefit from the Inkomati river basin natural resources. The majority (67%) of the population is classified as rural. The main activities developed by people living in Inkomati Water Management Area are: manufacturing, agriculture, services (government) and trade. The IWMA contributes approximately with 1.3% to the national Gross Domestic Product (GDP). The 1997 data revealed that manufacturing was the largest economic sector with a contribution of 24.6% to the basin GDP, followed by agriculture which was approximated at 18.6%, government at 16.4% and lastly trade with approximately 13.4% (DWAF, 2004). Interviews with stakeholders who were not able to present the figures indicated that mining is the dominant contributor to the IWMA GDP, followed by industry, irrigated agriculture and forestry.

### **3.2 Contextual factors and initial conditions**

Regarding the level of economic development of the country and river basin before and after the decentralization initiative, the ICMA has been receiving funds from the government and external donors. These funds have also showed an increase pattern over time. Specially, the funds received by the ICMA have increased from about 5 million rands in 2006 to about 30 million rands in 2010. This fact illustrates that the economic context of IWMA might have been contributing to an increase in likelihood of having a decentralized river basin. This is because an increase in financial resources allows the river basin to have financial capacity to bear transaction costs associated with decentralization initiative and ongoing costs that support and facilitate basin scale management. However, a reliance on donor support is not sustainable in the long-run.

Regarding the river basin population density, the respondents reported that Inkomati Water Management Area has 2,208,771 people with an area of 28,757 km<sup>2</sup>. These data suggest a population density of about 77 people per km<sup>2</sup>. Taking into account that the average world population density is 42 people per km<sup>2</sup>, the population density of IWMA (77 people per km<sup>2</sup>) is likely to be contributing positively to decentralization process of IWMA. Dinar et al. (2007) report that basins with high population density are likely to have a more successful decentralization process compared to basins with low population density.

Stakeholders' share of river basin resources before decentralization process: Chibwe (2011) reports that the distribution of river basin resources was highly skewed in favor of the minority of white South African citizens. However, South Africa changed its political regime from the apartheid system to that of a democratic dispensation in 1994. Although the country has experienced changes in the political arena, survey results show that there are still incidences of inequality to access and use of water resources among the various water users in the IWMA. South Africa has a Gini coefficient of 0.96

in terms of water use (Van Koppen & Jha and Merrey, 2002). This statistic entails that there is a large gap between water use and the equity line thus leaving many people without sufficient water resources for their daily usage. The inequality to access and use of water resources is partly attributed to the poor state of some water infrastructure in the IWMA. Conceptually related to the above is the aspect of self-financing for most Catchment Councils (Agencies), which has been found to be problematic. Additionally, there is a heavy reliance on donor support which is not sustainable in the long-run.

Finally, survey respondents reported that in the former homelands formerly disadvantaged individuals continue to face significant power imbalances in terms of knowledge and expertise compared with established white commercial farmers and other elite interest groups. There are evident differences between emerging farmers and commercial farmers in the IWMA in terms of water use. The commercial farmers are considered to be using more water than the quantity allocated to them as they have been pumping water during non-pump hours. These results suggest that the share of river basin resources is skewed in IWMA and it might have been contributing negatively to the decentralization performance of the IWMA.

River basin stakeholders' management capacity after decentralization initiative: The respondents did not report if the river basin organization has human capacity to manage water resources, however, they indicated that there are capacity building programs. Chibwe (2011) reports that the Inkomati CMA has built its managerial capacity over the period of its existence and it is now able to offer services to other CMAs. For example the Inkomati CMA has produced the catchment management strategy and it has been invited by Breede Overberge (BO) CMA to give input into the drafting of its catchment management strategy. These results suggest that the contextual factors of Inkomati Water Management Area are mixed but more likely towards the creation of decentralized river basin.

### **3.3 Decentralization process**

Regarding the length of decentralization process, according to DWAF (2001), the establishment of Inkomati CMA initiated in July 1997 by the regional office (RO) of DWAF Mpumalanga. The first step was the process of engaging stakeholders in Komati sub catchment. Stakeholders' engagement process was also initiated in Crocodile and Sabie sub catchments in July 1998 and February 1999, respectively. The engagement of stakeholders in the three sub catchments was used to bring representatives of each catchment to form a reference group. The reference group started to draft the Inkomati CMA proposal and it was finalized in September 2000. The Inkomati CMA proposal was submitted to DWAF Pretoria and it was approved in October 2001. It took quite some time before the reference group could meet again. The reference group met later on 17<sup>th</sup> of March 2004 to make recommendation to the minister of water affairs regarding the composition of governing body of Inkomati CMA and finally on 30<sup>th</sup> of March 2004, the Inkomati CMA was officially launched. These results show that it took almost seven years since the approval of water law in 1998 to establish the Inkomati catchment management agency (ICMA). The length of time needed to complete a decentralization process is difficult to estimate. However, Blomquist, Dinar and Kemper (2005) report that adequate time is needed to adjust changes and stabilize the decentralization process.

Concerning the number of institutions created and dismantled during decentralization process, the results show that the decentralization process did not eliminate existing institutions at national level while it has created and eliminated local level institutions. More specifically, decentralization created the Inkomati catchment management agency and two irrigation boards were converted into water user associations. Regarding the elimination of irrigation boards, the Act clearly states that: “within six months from the commencement of this Act a board must prepare and submit to the Minister a proposal, prepared according to section 91, to transform the board into a water user association.” However, in 2011, only two irrigation boards (IBs) have been transformed into Water User Associations (WUAs) out of the twenty seven existing IBs in the IWMA. The two WUAs are Upper Komati WUA and Elands River Catchment WUA (ERCWUA).

During the survey it was revealed that of the two WUAs, Elands River Catchment WUA has been relatively more active in water resource management issues than the Upper Komati WUA. Survey respondents stated that the Upper Komati WUA has been performing poorly because all members on the WUA board have been serving on a voluntary basis with demanding commitments from their full time jobs elsewhere.

Interest of transforming the existing Irrigation Boards (IBs) into Water User Associations has been expressed by most Irrigation Boards in IWMA. To this end, some IBs have submitted their applications to DWAF for consideration and have not yet received feedback over the status of their applications. In some cases where feedback has been received, it has been declined on the basis that the IBs have not met the criteria. This was for instance the case of the Komati Irrigation Board. The Komati Irrigation Board was told that there wasn't sufficient public participation from other stakeholders (other than large scale irrigators) in the area where the Irrigation Board operates. Some of the stakeholders cited absent included those from forestry and environmental groups.

Upon receiving the feedback, the Komati responded back to DWAF, regional offices in Mpumalanga, since it is the interface between the IBs and the minister. In its response, Komati IB stated that the members of the IB are farmers who do not have enough resources to set up meetings with all the stakeholders. The DWAF, regional offices in Mpumalanga agreed to organize the meetings and appointed consultants to perform the task on behalf of Komati IB. The current chairperson of Komati Irrigation Board at the time of the survey had served as the head of the committee which was set up to carry out the public participation for the area in question. However, when the process begun only two meetings were held and the process was discontinued by the consultants. A similar experience was earlier revealed at Elands River Catchment Water User Association (ERCWUA) formerly Elands Valley Irrigation Board (EVIB). Members of ERCWUA noted that they had encountered problems in drafting their constitution but successfully managed to draft the constitution in-house with the services of a legal expert.

Although few irrigation boards have been transformed into water users association, in the IWMA initiatives exist towards the creation of local level organizations. The creation of local level organizations is positively associated with the establishment of a decentralized river basin. Ostrom (1990) has indicated that the presence of basin-level governance institutions is a key variable to sustain successful resource preservation and efficient use since it is likely to increase the participation of river basin stakeholders in decentralization process.

The level of involvement of the river basin stakeholders in the decentralization process: Different stakeholders were involved in the development of the White paper and the 1998 Water Act as well as in creation of river basin organizations. At IWMA, the involvement of stakeholders was led by the government through DWAF regional office (RO) in Mpumalanga and the process started in 1997 before the approval of the 1998 Water Act. The identified stakeholders were either contacted by phone or written notice (letter) by DWAF officials. Each time new stakeholders were identified they were also contacted and motivated to participate in the proposal development process for the establishment of Inkomati CMA. In order to guarantee the participation of disadvantaged stakeholders, DWAF officials traveled to historically disadvantaged communities and companies to hold meetings with them. In cases where participants had incurred transport costs, they were reimbursed by the government through DWAF RO (DWAF, 2001).

When the 1998 NWA was passed, it became apparent that the Department of Water Affairs and Forestry (DWAF) head office, would take the lead in driving the process forward, as was provided for in the 1998 NWA. However, a consultant was hired in order to facilitate the stakeholder mobilization and participation process in 1998. This was done with the assistance and supervision of DWAF RO which was receiving institutional oversees from DWAF head office. The DWAF RO through the consultant that was hired facilitated several meetings that were held in the three separate sub-catchments between 1997 and 1999 with the intention of drafting the Inkomati CMA proposal. Each sub catchment developed a sub catchment proposal for its respective sub catchment. Finally the three sub catchments came together in 2000 and amalgamated their sub-catchment proposals to form one CMA (Inkomati CMA) proposal that was submitted to DWAF for consideration and the ICMA proposal was approved by DWAF in 2001. These results show a strong participation of stakeholders in the creation of ICMA and its sub catchments, which might contribute positively to the performance of the decentralization process.

The level of involvement of stakeholders on decentralization process can also be measured by the composition of governing board of ICMA, the process used to select board members and the degree of participation of stakeholders in river basin meetings.

When the Inkomati CMA was formally established in 2004, its capacity was low with a lean staff structure and no governing board in place. The board was appointed in 2006 to oversee the operations of the Inkomati CMA. The process of selecting board members starts with the appointment of an advisory committee by the minister of Water Affairs. The advisory committee then receives three nominations from each sector in the Inkomati WMA. The nominations are then submitted to the minister of Water Affairs, who under consultation finally appoints board members onto the governing board of the CMA. This is the process through which the Inkomati CMA board was ushered in. The governing board of ICMA was initially composed of thirteen members representing different stakeholders<sup>3</sup>; however during the period of data collection, the board was composed of ten members. Some stakeholders that were interviewed felt that there was

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<sup>3</sup> Chibwe (2011) reports that each of the following stakeholders (Industry, mining and power generation; commercial agriculture; civil society; tourism and recreation; productive use of water by the poor; forestry; conservationist; traditional leaders; and SALGA) have a representative in the Boards. The remaining members represent government agencies.

a need to have geographical representation rather than sectoral representation as the latter might lead the discussions towards sector interests and not the basin as a whole.

The level of attendance to board and basin meetings were reported to be 100% and 80%, respectively. Although the majority of basin stakeholders attend to the basin meetings, it was made clear by the respondents that some of the members of the governing board of the Inkomati CMA were passive and did not participate fully in the board deliberations. Most of the members who were alleged to be silent during most board meetings are those that represented disadvantaged communities of former homelands. Survey respondents indicated that the observed passiveness is partly attributed to low levels of knowledge on water resources in part of some stakeholders, which tends to lower their confidence. Additionally, to a great extent differences in educational levels among board members are also seen as a factor limiting the participation of some stakeholders.

It should be noted that to improve decentralization process, all stakeholders should be actively involved in the basin management process. However, the overall results of stakeholders' participation in decentralization process show an involvement of stakeholders in river basin decentralization process. Blomquist, Dinar and Kemper (2005) report that stakeholders' participation is key factor associated with the level of decentralization. The level of decentralization process is more likely to increase in settings where local people participate in decentralization initiative.

Additionally, the level of participation of river basin stakeholders in decentralization process can be measured by the level of authority given to different stakeholders to manage river basin resources before and after the decentralization process. Survey respondents were also asked to evaluate the share of responsibilities among river basin stakeholders regarding river basin management before and after decentralization initiative. The management decisions evaluated are water administration, infrastructure financing, water quality enforcement, setting water standards and water quantity management. The results are summarized in table 2 below, indicating that the decentralization initiative improved the participation of local stakeholders (basin level organizations) in the river basin management. It can be observed that before decentralization, local organizations did not play a role in the river basin management and national and state level government agencies were the unique managers of river basin. Conversely, after the decentralization process, local river basin organizations started to be involved in river basin management.

Table 2. Share of responsibilities regarding river basin management among different actors in IWMA

Responsibility for	Before decentralization			After decentralization		
	River basin level (%)	Regional office of the national water department (%)	National government level (%)	River basin level (%)	Regional office of the national water department (%)	National government level (%)
Water administration	0	50	50	50	25	25
Infrastructure financing	0	0	100	0	0	100
water quality enforcement	0	50	50	50	25	25
Setting water quality standards	0	0	100	25	0	75
Water quantity management	0	50	50	50	25	25

Specifically, table 2 above shows that responsibilities regarding water administration, water quality enforcement and water quantity management are equally shared by both local organizations and government agencies (regional and national level agencies) after the implementation of decentralization process. On the other side, the central government continues to play a significant role on management of infrastructure financing and setting water quality standards.

Moreover, stakeholders' participation in river basin decentralization process can be measured by the level of participation of stakeholders in water allocation and enforcing as well as monitoring water quality before and after decentralization process. Results show that water allocation was given to national government before the decentralization process and it became shared<sup>4</sup> between river basin organization and national office of water affairs after the decentralization process (Chibwe, 2011). Decentralization improved the participation of river basin organization in enforcing and monitoring water quality. This is because enforcing and monitoring water quality were performed by regional office of water affairs before decentralization process and after decentralization, river basin organization was given the task to enforce and monitor water quality. Given that river basin level organizations have become responsible for water administration, water quality enforcement, setting water quality standards and water quantity management after decentralization process (table 2 above), it seems that river basin stakeholders have been progressively involved in the decentralization process, increasing its likelihood of success.

Finally, the outcome of decentralization process depends on the type of devolution of decentralization process. As described above, the decentralization process initially started as a top-down approach led by the DWAF RO in Mpumalanga; however, it turned out to be a mutually desired process, when stakeholders joined the process. This outcome contributes positively to a creation of a decentralized river basin. The overall evaluation indicates that although the Inkomati Water Management Area has not yet

<sup>4</sup> Survey respondents were not able to measure the percentage of sharing responsibilities regarding water allocation between river basin organization (ICMA) and national office of water affairs.

achieved its decentralization objectives, stakeholders' participation is improving with decentralization process and this might lead to an increase in the performance of the Inkomati Water Management Area decentralization process.

### **3.4 Central government/basin-level relationships and capacities**

This category includes the following variables: (i) sources of river basin budget and (ii) percentage of tariffs remaining at the basin.

Source of river basin budget: The respondents were not able to access the level of contribution of different stakeholders to river basin budget. Chibwe (2011) reports that Inkomati CMA has currently two funding profiles. A parliamentary allocation which comes from government coffers and an external funding that comes from the donor community. The commitment of central government in financing the Inkomati CMA might contribute positively for the decentralization process; however dependence on external funds do not guarantee sustainability in long run.

Percentage of tariffs remaining at the basin: The respondents were not able to state the percentage of tariffs staying at basin level as well as the destinations of the water tariffs. Chibwe (2011) reports that water tariffs are currently collected by water affairs regional office. This fact indicates that none of the water tariffs is managed by stakeholders in the Inkomati Water Management Area and therefore the Inkomati CMA does not have financial autonomy and it is heavily depending on external donors and the government financial resources to implement basin activities. This result is likely to contribute negatively to the decentralization process and performance of IWMA.

The impact of central government/basin level relationship on the direction of decentralization process and its performance is mixed. While the central government has been showing its commitment in decentralization process by canalizing funds for decentralization process but it has also been the single manager of the financial resources (water tariffs) generated at basin level.

### **3.5 Internal configuration of basin-level institutional arrangements**

Under this category we use the following variables: (i) river basin organizational structure, (ii) information sharing variables within the basin, and (iii) mechanisms for dispute resolution.

In terms of river basin organizational structure, Chibwe (2011) reports that the IWMA is governed by Inkomati Catchment Management Agency (ICMA). The ICMA is lead by a governing board; however the daily activities of the ICMA are lead by chief executive officer (CEO) assisted by managers and support staff. The ICMA interact directly with three executive committee officers representing the three subcatchment: Sabie, Crocodile and Komati. Below the executive committees are water users. River basin water users are organized in associations (water user associations) and irrigation boards. As described in section 4.3 above, the irrigation boards have to be transformed into water user association. However, only two irrigation boards have formed the Elands River Catchment WUA and Upper Komati WUA. The functionality of the WUAs is still weak since only the Elands River Catchment WUA is functional. This result is likely to contribute negatively to the decentralization process of Inkomati Water Management Area.

Information sharing variables within the basin: Respondents reported that there are different mechanisms for information sharing such as board meetings, annual reports, radio stations such as Ligwalagwala FM, Munghana Leonene FM, Laeveld Radio, Mpower FM, Lowvelder and Mpumalanga News. Basin reports and profiles are also used as mechanisms for information sharing. The results show that there is a large number of mechanisms used to share information; however, the limited participation of some stakeholders in board meetings might contribute negatively to the decentralization process and performance of IWMA.

Mechanisms for dispute resolution variables: Survey respondents reported that Inkomati Water Management Area has legal arrangements (water tribunals), which have been used for water conflict resolutions. The existence of mechanisms for conflict resolutions might have positive impacts on the river basin decentralization process and its performance.

### **3.6 Decentralization performance**

The performance of decentralization is measured by (a) the level of accomplishment of the river basin objectives, (b) the degree at which stressed resource conditions have been affecting the river basin stakeholders before and after the decentralization process and (c) the existence of water rights before and after the decentralization process.

Regarding the degree of accomplishment of original objectives of river basin decentralization process, the results indicate that the main objectives of the Inkomati Water Management Area decentralization process were: to reduce water scarcity and water conflicts as well as assuring water quality. Survey respondents indicated that these objectives have been reached partially. The decentralization process improved by 25% the problems related to water scarcity and conflicts and by 50% the problems related to water quality. These results suggest that there are signs of improvement in performance of decentralization process in the Inkomati Water Management Area.

The level of problems related to river basin stressed resources before and after decentralization process. In this regard, respondents were asked to rank the level of problems associated with the river basin stressed resource before and after the decentralization process using the following categories: (1) no response, (2) no problem, (3) some problem and (4) severe problems. The evaluated stressed resource problems are water scarcity, floods, environmental quality, land degradation (erosion, salinity, etc.), water conflicts, water storage, and river ecology, among others.

Results showed that decentralization initiative did not change the state of the majority of the problems stated above and they were ranked to have some problems (category 3 above) before and after the decentralization process. However, decentralization process improved the availability of water and reduced water conflicts. While water scarcity and water conflicts were perceived to represent severe problems (category 4 above) before the decentralization process, the same factors were perceived to represent some problems (category 3 above) after the decentralization process. These results support that decentralization performance has been increasing since some problems related to stressed resources conditions (availability of water and water conflicts) have been in process of being reduced.

Respondents were also asked to report the existence of water rights before and after the decentralization process. The results show that before the introduction of the new NWA and subsequently the decentralization initiative, there were permanent water rights and these rights were eliminated with the introduction of the new NWA.

### **3.7 Derived impact of the studied variables**

The methodology used in this study focuses on evaluating the impact of the studied variables on decentralization process and performance. This is performed by comparing the observed results of the study with hypotheses made in the literature (Dinar et al. 2007) about the possible impact of the analyzed factors on the decentralization process and performance. This section summarizes the impacts of studied variables on decentralization process and performance of IWMA. In the following table (Table 3), the four groups of variables included in the methodology are presented and their possible impact on the decentralization process of IWMA is indicated.

According to the table 3 below, the studied contextual variables show that the level of economic development in the country and in the catchment at the moment when decentralization started was growing in South Africa coupled with the increased interest from external donors to fund water projects after the elimination of apartheid regime. This fact is rated as contributing positively to decentralization process and performance of IWMA. The distribution of resources among basin stakeholders indicated critical situations as the distribution of water resources among local stakeholders at the beginning of decentralization process was skewed in South Africa with the white people dominating the ownership of water resources. The level of managerial skills by local stakeholders was seen to be limited at the beginning of the decentralization process and it was developed after the implementation of the ICMA.

The decentralization process variables are all assessed to have been contributing positively for the decentralization performance of IWMA. This is mainly due to involvement of basin stakeholders during different stages of decentralization process. Similar to decentralization process variables, the majority of the variables under configuration of basin-level institutional arrangements are evaluated to contributing positively to the decentralization process. This is due to the creation of river basin based organization (ICMA and water user associations) as well as the existence of mechanisms (water tribunals) for conflict resolutions.

Variables under central government/basin-level relationships and capacities are assessed to be contributing negatively to decentralization process and performance of IWMA since the catchment depends on external funds, which is not sustainable in the long-run and water tariffs are not managed by the basin based organization.

Table 3. Summary of the hypothetical Impact of Institutional Variables on Decentralization Process and Performance in Inkomati Water Management Area

<b>Variables</b>	<b>Possible impact on decentralization process and performance</b>
<i>Contextual factors and initial conditions</i>	
Level of economic development	▲ <sup>a</sup>
Distribution of resources among basin stakeholders	▼
Stakeholders managerial skills	▲▼
<i>Characteristics of decentralization process</i>	
Composition of catchment boards & degree of stakeholders participation	▲
Stakeholders involvement in decentralization process	▲
Type of devolution of the decentralization process	▲
<i>Central Government/Basin-level Relationships and Capacities</i>	
Sources of river basin budget	▼
Percentage of water tariffs remaining at the basin	▼▼
Level of management authority given to basin stakeholders	N/A
<i>Configuration of Basin-Level institutional Arrangements</i>	
Presence of basin-level governance institutions	▲
Information sharing	▲▼
Mechanism for conflict resolution	▲

<sup>a</sup>Notes: ▲▲ =highly positive impact; ▲ = positive impact; ▼▼ =highly negative impact; ▼ =negative impact; ▲▼=contrasted impact.

Table 4 below shows the outcomes of decentralization performance of IWMA based on perceptions of the survey respondents. Hence these performance assessments must be taken with all precautions as they come from individual perceptions from a limited sample of interviewees.

The results indicate that the performance of IWMA is limited. The level of accomplishment of basin objectives and the improvement of problems related to river basin stressed resources after decentralization are accessed to have been producing contrasted performance. This is because the objectives of decentralization process and the reduction of problems related to river basin stressed resources during decentralization process were only attained partially. Additionally, the introduction of water permits during decentralization process is viewed as producing good performance.

Table 4. Decentralization performance according to survey respondents in IWMA

<i>Decentralization performance</i>	Inkomati Water Management Area (South Africa)
Level of accomplishment of river basin objectives	▲▼ <sup>a</sup>
Improvement of problems related to river basin stressed resources after decentralization	▲▼
Introduction of water permits	▲

<sup>a</sup>Notes: ▲▲ = very good performance; ▲ = good performance; ▼▼ = very bad performance; ▼ = bad performance; ▲▼ = a contrasted performance.

#### 4 Conclusions

This study aims to provide knowledge to river basin managers and other stakeholders as well as policy makers regarding the state of decentralization process of the Inkomati Water Management Area. Specifically, the objectives of the study are to describe the Inkomati Water Management Area, analyze the factors that have potentially affected the results of decentralization process in Inkomati Water Management Area, and analyze the performance of decentralization process in the Inkomati Water Management Area.

The IWMA is characterized by heterogeneity in its climate with predominance of two distinct areas: the plateau area in the west and a sub - tropical Lowveld area in the east. The IWMA is well endowed with water infrastructures mainly dams, which have contributed positively to the economy of the IWMA and the country as a whole. Particularly, the manufacturing and irrigated agriculture are the main sectors that contribute to the basin GDP and the IWMA contributes with approximately 1.3% to the country GDP.

In respect to the factors that are potentially related to the decentralization of IWMA, this study suggests that initial conditions, characteristics of the decentralization process, central government/local level relationships and internal configuration of basin-level institutional arrangements are key in the successful implementation of decentralization initiatives.

The implementation of the National Water Act (1998), which introduced the concept of Water Management Areas (19 in South Africa) and opened the era of the Catchment Management Agencies, can be seen as contributing positively to the creation of a decentralized water management system in the country. Although the decentralization process of IWMA was first initiated by the DWAF regional office, basin stakeholders' engagement was pronounced during the establishment of ICMA and stakeholders have been actually playing an important role towards decentralization process of IWMA. In the studied area, evidences related to the positive outcomes of decentralization process can be seen by the reduction of water scarcity and conflicts and water quality problems.

Despite the mentioned encouraging signs of success in the decentralization process of IWMA, several factors are still affecting negatively the process. These are: the dependency on donors and government funds, the lack of involvement of basin level organization (ICMA and its sub catchments) in collecting water tariffs. This shortcoming removes financial autonomy of river basin organizations and therefore limits the availability of financial resources, which can be used for developing projects located within the basin.

Another contextual factor that has been contributing negatively to the decentralization initiative of IWMA is power imbalances in terms of knowledge and expertise between disadvantaged individuals leaving in former homelands and other prominent stakeholders. The disadvantaged groups of stakeholders have been passively participating in river basin management and benefit less from river basin resources compared to prominent stakeholders.

The length of the process of transformation of the existing irrigation boards into water users associations is a signal of concrete difficulties as well. Although the 1998 Water

Law states that “within six months of the commencement of this Act a board must prepare and submit to the Minister a proposal, prepared according to section 91, to transform the board into a water user association”, in the IWMA only two irrigation boards have been transformed into water user association. This result is in part due to the lack of financial resource at the level below the ICMA to finance basin activities and the procedures needed to be followed. The limitation of funds at the level below the ICMA is also affecting negatively the involvement of the few created water user association in the management of basin resources.

Given these limitations, in order to improve decentralization process in IWMA, the DWAF RO Mpumalanga should consider empowering basin organizations (ICMA, WUAs) with financial resources collected from water tariffs and involve these organizations in the management of these funds. DWAF should seriously consider reviewing proposals to transform Irrigation Boards into Water User Associations and empower the irrigation boards and water user association with legal and technical knowledge necessary to perform basin activities.

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6 Annex I. Key Informants in Inkomati Water Management Area (South Africa)

N.	Organization
1	Inkomati Catchment Management Agency Staff member
2	Department of Agriculture in Mpumalanga
3	Inkomati Catchment Management Agency Staff member and currently acting as CEO
4	Department of Water Affairs Regional Office
5	Former CEO of Inkomati Catchment Management Agency
6	Board Member of Inkomati Catchment Management Agency
7	Chairperson-Komati River Irrigation Board
8	SALGA in Mpumalanga
9	Bushbuckridge Water Board
10	Bushbuckridge Municipality
11	Traditional Leader
12	Civic
13	Emerging Farmers
14	Emerging Farmer
15	SAPPI
16	Barberton Mines
17	Ehlanzeni District Municipality
18	Silulumanzi/Sembcorp
19	Tsb Sugar - Komati Mill in Malelane
20	Board Member of Inkomati Catchment Management Agency