

*Miljörätten och den  
förhandlingsovilliga  
naturen*

*Vänbok till Gabriel Michanek*

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# Mind the Gaps in Sustainable Water Governance

Lessons from Strategic Adaptive Management  
in the InComati river basin

## 1. Introduction

South Africa's water management is in transition, starting with the regime shift in 1994 and the coming into force of a new Constitution guaranteeing the right to water for all. This was followed by renewed water legislation and the introduction of Catchment Management Agencies throughout the country as the responsible governmental institutions for water resource management. An analysis carried out in 2009 by the Association for Water and Rural Development showed the following key findings that have to be addressed to improve water management in South Africa:<sup>1</sup>

<sup>1</sup> Ramin Pejan, Alexandra Robertson, Jonathan Cogger, Dimakatso Sefatsa & Marysia Emmer-son, The shared river initiative Phase II, part 2, Legal competence and regulation, Report to the Water Research Commission by the Association for water and rural development, WRC report No TT 573/13, September 2013, p. 4.

- A generally poor understanding of the Ecological Reserve and hence failure to change practices.
- The almost total lack of integration of water resources management and supply.
- Some degree of unlawfulness but more importantly weak regulation of unlawful use and poor legal literacy.
- Some seemingly excessive lags in the implementation of the Reserve and emergence of sustainability discourse.
- Various examples of the emergence of, or lack of, self-organisation, leadership and feedback loops in adaptive action and management.
- Attendant dearth of skills, capacity, monitoring and legal literacy with some exceptions.
- The importance of participatory and representative platforms for collective action: their functioning and contribution to IWRM.

This paper analyses the improvements that have been achieved since 2009 and focuses on the InComati catchment.

South Africa has several closing<sup>2</sup>, semi-arid<sup>3</sup>, run-of-river<sup>4</sup> dominated transboundary river basins, which are especially sensitive and susceptible to degradation. The InComati is an excellent example of such a basin, as it is dealing with issues such as water scarcity, water quality problems, and a hampering coordination between water resource management and water services – to name only a few. The recent 2015 to 2016 drought was the most severe on record<sup>5</sup> and further exacerbated existing tensions and challenges with the potential to lead to a water crisis.

<sup>2</sup> River catchments are said to be closing when the supply of water falls short of commitments to fulfil demand in terms of water quality and quantity within the catchment and at the river mouth, for part or all of the year (M. Falkenmark and D. Molden (2008). Wake Up to Realities of River Basin Closure. *International Journal of Water Resources Development*, 24:2, 201–215; F. Molle, P. Wester and P. Hirsch (2009). River Basin closure: Processes, implications and responses. *Agricultural Water Management* 97 (2010) 569–577).

<sup>3</sup> Semi-arid rivers have highly seasonal flow regimes with a marked pattern of low or zero flow during the dry season.

<sup>4</sup> A run-of-river dominated catchment can be defined as a river system that has no or little in-stream storage available for the management of the flow (ICMA, 2010).

<sup>5</sup> Riddell et al. (2017) Testing Strategic Adaptive Management during Crisis: management of the Perennial Rivers of the Kruger National Park during Drought. 14th International Water Association Specialist Conference on Watershed and River Basin Management, 9–11 October, Skukuza, South Africa.

Furthermore, a water crisis is frequently a crisis of governance.<sup>6</sup> Due to the complex nature of water systems (multilevel, multiscale, multisector and multi-actor), a comprehensive water governance approach is needed in which water policy is developed and implemented with the support of different stakeholder groups in which the numerous legitimate, value driven, interlinked and interdependent social, technical, ecological, economic and political (STEEP) needs and outcomes are recognised.

### **1.1 Strategic Adaptive Management in the InComati**

River basin- or water resource-management in the aforementioned circumstances can be characterised as a wicked problem,<sup>7</sup> where value-pluralism and unclear boundaries make it impossible to identify one correct problem definition, solution, or set of conditions to determine whether the problem has been resolved. Problems of this kind are managed rather than resolved, as continuously changing circumstances and different stakeholder values make it impossible to ever conclude that the problem has been resolved.<sup>8</sup>

One way to deal with wicked problems and conduct participatory water governance cognisant of people's values in complex river basins is through Strategic Adaptive Management (SAM).<sup>9</sup> This method was originally developed in South Africa for the Kruger National Park (KNP) as an outcome

<sup>6</sup> P Rogers, A W Hall *Effective Water Governance Vol 7*; Stockholm Global Water Partnership 2003.

<sup>7</sup> Rittel, Horst WJ, and Melvin M. Webber. "Dilemmas in a general theory of planning." *Policy sciences* 4.2 (1973): 155–169.

<sup>8</sup> Pahl-Wostl C, Lebel L, Knieper C, Nikitina E (2012) From applying panaceas to mastering complexity: towards adaptive water governance in river basins. *Environ Sci Pol* 23:11; Quevauviller P (2010) Is IWRM achievable in practice? Attempts to break disciplinary and sectoral walls through a science-policy interfacing framework in the context of the EU water framework directive. *Irrig Drain Syst* 24:13; Rijke J, Brown R, Zevenbergen C, Ashley R, Farrelly M, Morison P, Van Herk S (2012) Fit-for-purpose governance: a framework to make adaptive governance operational. *Environ Sci Pol* 22:12.

<sup>9</sup> Rogers, K. H., & Bestbier, R. (1997). *Development of a protocol for the definition of the desired state of riverine systems in South Africa*. Dept. of Environmental Affairs and Tourism.; Biggs, H. C., & Rogers, K. H. (2003). An adaptive system to link science, monitoring and management in practice. *The Kruger experience: Ecology and management of savanna heterogeneity*, 59–80.; Rogers, K. H., Sherwill, T., Grant, R., Freitag-Ronaldson, S., & Hofmeyr, M. (2008). A framework for developing and implementing management plans for South African National Parks.

of the Kruger National Park Rivers Research Program (KNPRRP)<sup>10</sup> of the 1990's and has subsequently been adapted and formalised into the management and operations of other institutions such as the Inkomati-Usuthu Catchment Management Agency (IUCMA).

SAM is inspired by the 'adaptive management approach' for dealing with complexities and uncertainties in ecosystem management<sup>11</sup> and trans-boundary water and catchment area management.<sup>12</sup> Moreover, it satisfies the requirement that water management should emphasise participation<sup>13</sup> and is designed to achieve the consensus-based "future building" envisaged by the South African legislation. In short, it is a simple yet robust system for participatory planning, decision making and review.

SAM combines social and natural scientific approaches and integrates insights from adaptive management theory and co-management.<sup>14</sup> It facilitates action with foresight and purpose, learning whilst doing, and engagement and empowerment of stakeholders.<sup>15</sup> Therefore, SAM is an appropriate strategy supporting the sustainable governance of water resources at the catchment level.<sup>16</sup>

<sup>10</sup> C. Breen, M. Dent, J. Jaganyi, B Madikizela, J. Maganbeharie, J. Ndlovu, *et al.*, 2000, 'The Kruger National Park Rivers Research Programme', Final report, Water Research Commission, Pretoria.

<sup>11</sup> Folke, *et al.* (2002). "Resilience and sustainable development: building adaptive capacity in a world of transformations." *AMBIO: A journal of the human environment* 31.5 (2002): 437–440.; Gunderson & Light (2006). Adaptive management and adaptive governance in the everglades ecosystem. *Policy Sciences* 39.4 (2006): 323–334.

<sup>12</sup> e.g. Biggs & Rogers 2003; Pahl-Wostl (2007). Transitions towards adaptive management of water facing climate and global change. *Water Resources Management*, 21:49–62. DOI 10.1007/s 11269-006-9040-4.

<sup>13</sup> Dublin Principles, 1992; Akhmouch, A., & Clavreul, D. (2016). Stakeholder engagement for inclusive water governance: "Practicing what we preach" with the OECD water governance initiative. *Water*, 8(5), 204.

<sup>14</sup> Roux & Foxcroft (2011). The development and application of strategic adaptive management within South African National Parks. *koedoe* 53.2 (2011): 01–05.

<sup>15</sup> Grant, *et al.* (2008). *A framework for developing and implementing management plans for South African National Parks*, South African National Parks, Pretoria.

<sup>16</sup> Mwangi, E., Markelova, H., Meinzen-Dick, R. (2012), Introduction and overview (Editorial), in: Mwangi, E., Markelova, H., Meinzen-Dick, R. (eds.), *Collective action and property rights for poverty reduction: Insights from Africa and Asia*, University of Pennsylvania Press, Philadelphia, pp. 3–24.

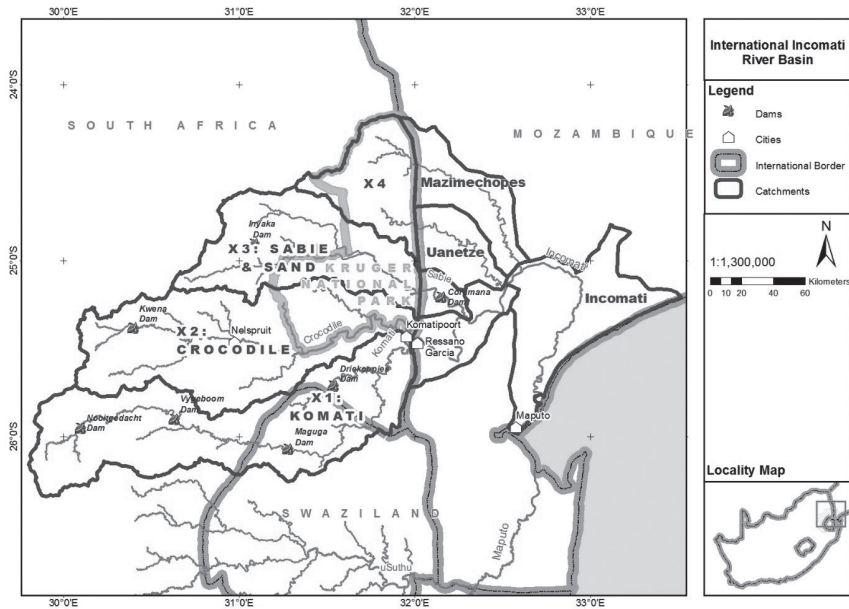


Figure 1: The main rivers and sub-catchments of the International InComati Catchment within Mozambique, South Africa and Swaziland. The South African portion is referred to as the Inkomati. Source: IUCMA, 2010.

The IUCMA has been established as South Africa’s first of nine decentralised water management authorities and is attempting to implement integrated water resources management in the Inkomati basin through SAM. The IUCMA embraced SAM in their first generation Catchment Management Strategy (CMS) in 2009 and has subsequently implemented it in the Inkomati<sup>17</sup> (see Figure 1) with emphasis on the Crocodile River Catchment.<sup>18</sup>

After over seven years of implementation it would seem apt to identify, understand and reflect on the challenges.

<sup>17</sup> Rogers, K. H., & Luton, R. (2011). Strategic adaptive management as a framework for implementing integrated water resource management in South Africa. *WRC Report No. KV, 245*(10).

<sup>18</sup> Brian Jackson (2014), *An Adaptive Operational Water Resources Management Framework for the Crocodile River Catchment, South Africa*, Centre for Water Resources Research, University of KwaZulu-Natal.

## 2. Conceptual Framework and Method

This paper will analyse the existing water resource management in the InComati river basin and identify the main problems and challenges from a multidisciplinary perspective.

The research builds on earlier research carried out by Jackson on the development, implementation and evaluation of SAM in the Inkomati, with emphasis on the Crocodile river basin.<sup>19</sup> This research tries to understand what is working and what hampers the effective implementation of SAM in the greater InComati basin at the moment. The timing is fortuitous, as the 2015 to 2016 drought, which was the most severe on record,<sup>20</sup> has since occurred and allowed SAM to be tested during a time of crisis.

The analysis will use the ten building block framework method developed by Van Rijswick et al (2014) as this explicitly includes several disciplines and incorporates not only the phase of policy development but also more crucially the implementation phase, looking at water resources from a holistic perspective with specific attention to the context in which actual water management takes place.

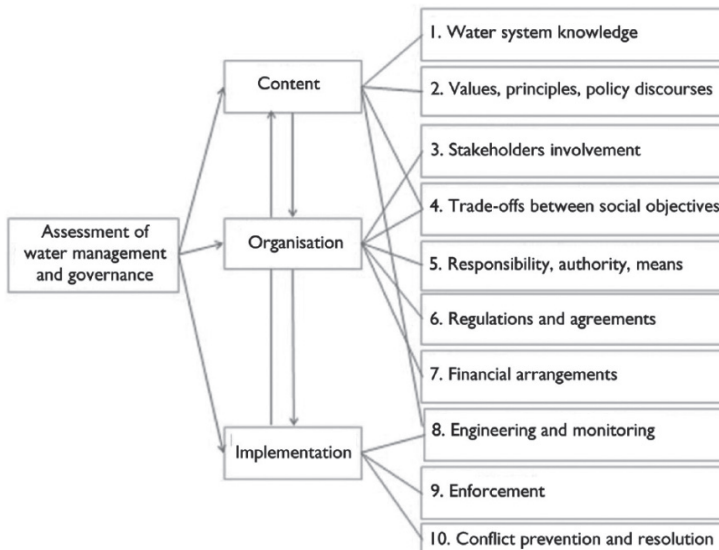


Figure 2: The cyclical aspect of the 10 building-block assessment method, Source: M van Rijswick and others.

<sup>19</sup> Jackson, B. (2014).

<sup>20</sup> Riddell, E., et al. (2017).

The method has been used and refined in the previous years, focusing on specific drivers and impacts that asked for a specification of the water knowledge part. It has been used amongst others to assess the protection of drinking water resources in the Netherlands,<sup>21</sup> transboundary water quantity management in the Scheldt river Basin,<sup>22</sup> the realisation of the right to water in Suriname,<sup>23</sup> water quality management in China,<sup>24</sup> and the allocation of water use rights in China, Indonesia, Kenya, the Netherlands and South Africa.<sup>25</sup> The method is suitable to assess SAM in practice as most elements in the method include the crucial elements of SAM as the figure above shows. It is the relationship between the content, organisation and the actual implementation of SAM which is crucial for successful adaptive management.

The assessment method assumes that water governance is sound when three main dimensions and the corresponding 10 building blocks are taken into consideration (Figure 2). Sound water management requires knowledge about the water system in time and space and about values, principles and policy discourses. This knowledge is required to come to an agreed service level with regard to specific aspects of water management such as improving water quality, an equitable distribution of scarce water or a sustainable coordination between water services and water resource management. The organisational process requires sufficient stakeholder involvement at both the beginning of the policy process as well as in the implementation phase, insight into the trade-offs between social objectives, attribution of responsibilities, authorisation and the associated means as well as appropriate planning, regulations and agreements. Finally, the agreed service level has to be implemented, which requires inter alia engineering of infrastructure, monitoring and enforcement, as well as conflict prevention and resolution. Important elements at the international level are the design of the trans-

<sup>21</sup> Susanne Wuijts & Peter P. J. Driessen & Helena F. M. W. Van Rijswijk, (2017), Governance Conditions for Improving Quality Drinking Water Resources: the Need for Enhancing Connectivity, *Water Resource Management*, <https://doi.org/10.1007/s11269-017-1867-3>.

<sup>22</sup> C. Suykens (2017), The Law of the River: The Institutional Challenge for Transboundary River Basin Management and Multi-Level Approaches to Water Quantity Management (diss. University of Leuven and Utrecht University).

<sup>23</sup> D. Misiedjan, 2017, Towards a Sustainable Human Right to Water. Supporting vulnerable people and protecting water resources. With Suriname as a case study (diss. Utrecht University).

<sup>24</sup> Dai, L. (2015). Identifying and understanding the main challenges for sustainable water resource management in China. *Journal of Water Law*, 24 (5/6) (pp. 249–264).

<sup>25</sup> L. Dai; Van Rijswijk, H.F.M.W., Schmidt, B. (2018), Towards a sustainable, balanced and equitable allocation of water use rights, in: In Erkki Hollo (ed) *Management of water resources from a legal perspective*.



boundary agreements or informal cooperation at the level of local and practical implementation.

A stakeholder analysis has been done partly based on desk research and partly by means of 36 semi structured interviews with a wide variety of stakeholders both from the public and the private sector, and attendance of a meeting of the bimonthly water forum, which is an institution explicitly designed for stakeholder participation. At the meeting of the water forum the preliminary results of the research have been presented and discussed.

### **3. Applying the Assessment Method**

Although this article refers to river basin, or water resources management, in general, the ten building blocks assessment method will focus on the challenges associated with water availability and water resource quality, as well as the nexus between water services and water resources management for both these fields.

#### **3.1 Water System Knowledge**

Extensive information about the water resources of the Inkomati basin is available. Comprehensive studies on the water resources availability, ecological flow requirements, resource quality objectives and existing lawful water uses have or are being conducted. The Department of Water and Sanitation (DWS) and the IUCMA also maintain extensive monitoring programmes for surface water quantity and quality. The IUCMA maintains a real time water resources information database and decision support system and shares this information with stakeholders through a “rapid response system” as well as at the Crocodile Operations Committee (CROCOC), which meets every quarter. This generates extensive shared knowledge on the catchment about the water resource system status, forecast and water use status, thereby enhancing consensus based decision making and feedback loops in the South African portion of the basin. The IUCMA has also conducted a stakeholder information needs analysis and a review of existing data.<sup>26</sup> Information gaps were identified and are being rectified, with some innovative information sources such as remote sensing, radar and crowd sourcing being investigated, as well as new ways to share this data using the HydroNET platform. They are also developing a flood prediction and warning system, are installing real time water quality probes at key monitoring

<sup>26</sup> Jackson, B. (2014).

sites and have installed a Geonetcast Satellite dish and data acquisition software. Finally, the IUCMA further conducted a social learning based stakeholder survey of the Crocodile Catchment Operations Committee members.

There is also a comprehensive understanding of the surface water resources in the Swaziland portion of the basin through the Komati Basin Water Authority (KOBWA). KOBWA also has an operations committee to facilitate consensus based decision making with stakeholders and has also conducted a stakeholder information needs analysis. Furthermore, they also operate various water resources models to understand the resource dynamics and assist with decision making and maintain a comprehensive database of water resources information.

Very little information and knowledge sharing occurs with the Mozambican portion, which is a challenge. This is starting to change as a result of the HydroNET platform ([www.hydronet.com](http://www.hydronet.com)) implemented by the IUCMA, which enables Mozambique and Swaziland partners to access much of the data hosted by the IUCMA through the cloud and without the need for any infrastructure or IT solutions themselves, aside from internet access. The HydroNET platform is discussed further in section 3.8.

Knowledge gaps with regard to groundwater and surface water, groundwater interactions do exist.

The availability of water system knowledge in the water services sector is promoted by the DWS Blue and Green Drop programs. The Blue Drop program measures municipal performance related to drinking water supply standards, whereas the Green Drop program measures performance against certain wastewater quality management and discharge standards. For example, under the green drop program, municipalities will be awarded green drop status when they score 90% or higher on a number of criteria. The idea behind the program is to stimulate compliance with wastewater regulation through positive incentives and reward rather than by sanctioning negative behaviour. To implement this system, DWS runs the Green Drop Water services audit. Data is being collected on process control, maintenance and management skills; wastewater quality monitoring; credibility of wastewater sampling and analysis; submission of wastewater quality results; wastewater quality compliance; management of wastewater quality failures; storm-water and water demand management; by-laws; capacity and facility to reticulate and treat wastewater; publication of wastewater quality performance; and wastewater asset management.<sup>27</sup> This information is distributed

<sup>27</sup> Burges, Jo, *South African Green Drop Certification for Excellence in Wastewater Treatment Plant Operation*, p. 1–2.

by customers, the media, politicians and NGOs. Although the program has not managed to resolve the issues with wastewater treatment, it has raised awareness about the level of performance in the wastewater sector, and the need for improvement. The Green Drop program supplies municipalities with information about individual wastewater treatment works, enabling them to monitor their performance and if needed, to take action.<sup>28</sup> The blue drop program functions in a similar manner.

### *3.1.1 Stressed Catchment*

The extensive information and knowledge available indicates that the InComati catchment – especially the Crocodile and Komati Rivers – is a closing, or stressed, catchment. The closing status is a result of a number of factors including:

- i. High water demand versus the available supply (Figure 3).
- ii. Significant variability and seasonality in available water in both time and space.
- iii. Low storage capacity in relation to the water demand in the catchment (i.e. it is a run-of-river dominated catchment).
- iv. Rainfall areas and main irrigation demand areas are spatially disparate.
- v. It is a long river (length of approximately 250 km), which makes it difficult to manage during low flow periods, when lags are long and losses can be significant and unpredictable.
- vi. Water Quality problems in some areas.
- vii. International obligations for water sharing with Mozambique and Swaziland.
- viii. Ecologically important to the Kruger National Park with ecological flow requirements in place.

<sup>28</sup> Ntombela, Cebile, et al. “A critical look at South Africa’s Green Drop Programme.” *Water SA* 42.4 (2016): 703–710, p. 705.

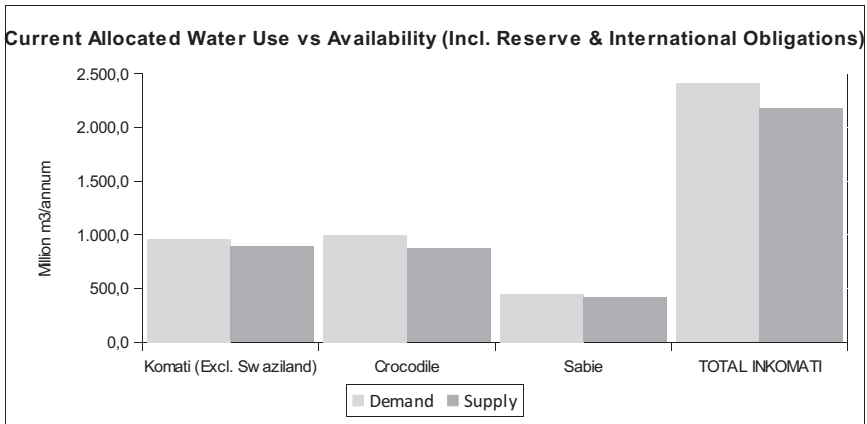


Figure 3: 2010 water availability and demand within the IWMA including ecological flow requirements and international obligations (ICMA, 2010).

## 3.2 Values, Principles, Discourses

### 3.2.1 Values

In terms of values, South Africa is a pluralistic society.<sup>29</sup> Culture, policy and law are affected by both European liberalism and more traditional values reflected in the African philosophy of Ubuntu.<sup>30</sup>

Although Ubuntu is hard to define, it is characterised by values like group solidarity, conformity, compassion, respect, human dignity, humanistic orientation and collective unity. Ubuntu relies on the understanding that people exist in relation to society.<sup>31</sup> This value system affects the legal system. While Ubuntu is not explicitly mentioned in the Constitution, it is reflected in its provisions, and is used as an overarching interpretative concept for that constitution. According to the court,

“The spirit of Ubuntu, part of the deep cultural heritage of the majority of the population, suffuses the whole Constitutional order. It combines individual

<sup>29</sup> Cornell, Drucilla. “uBuntu, pluralism and the responsibility of legal academics to the new South Africa.” *Law and Critique* 20.1 (2009): 43–58; Rautenbach, Christa. “Deep legal pluralism in South Africa: Judicial accommodation of non-state law.” *The Journal of Legal Pluralism and Unofficial Law* 42.60 (2010): 143–177.

<sup>30</sup> Comaroff, Jean, and John Comaroff. 2003. Reflections on liberalism, policulturalism, and ID-ology: Citizenship and difference in South Africa. *Social Identities* 94(4): 59–62, p. 59.

<sup>31</sup> Makgoro, Yvonne. “Ubuntu and the law in South Africa.” *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad* 1.1 (1998).

rights with a communitarian philosophy. It is a unifying motive of the Bill of Rights, which is nothing if not a structured, institutionalised and operational declaration in our evolving new society of the need for human interdependence, respect and concern.”<sup>32</sup>

Section 24 of the Constitution grants the right to an environment that is not harmful to people’s health or wellbeing, and to have that environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

SAM, with its focus on community and participation as well as the reconciliation of different values and perspectives, seems naturally suited to this philosophical perspective of Ubuntu. In water law, it is reflected in section 80(e) of the National Water Act (NWA), as well as in the description of the initial function of Catchment Management Agencies (CMAs) to promote community participation in the protection, use, development, conservation, management and control of the water resources in its area.

More specific to water resource management are the value of ‘water for all’ and the recognition of the importance of the natural environment for human well-being. Section 27 of the Constitution guarantees the right to access to water and that the state must take reasonable measures to achieve the realisation of this right. The inclusion of the right to access to water goes beyond the requirements of the main international human rights instruments, showing the prominence of this value in the South African context.<sup>33</sup>

The vision of ‘water for all’, that lies at the core of South African water legislation and the policies of the national DWS contains a large range of values including sustainability, efficiency and equity. These values are further embodied in the vision of DWS’s National Water Resources Strategy (NWRS)<sup>34</sup> of ‘Sustainable, equitable and secure water for a better life and environment for all’.

The preamble to the NWA holds that ‘the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all

<sup>32</sup> *Port Elizabeth Municipality v Various Occupiers*, para 37.

<sup>33</sup> The International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights are silent on this matter, see A. Gowlland-Gualtieri, 2007, p. 3.

<sup>34</sup> *National Water Resources Strategy; Water for an Equitable and Sustainable Future*, DWS, 2013, available at <http://www.dwa.gov.za/documents/Other/Strategic%20Plan/NWRS2-Final-email-version.pdf>.

users.’ The Act aims to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled in ways which take into account, i.a., ‘meeting the basic human needs of present and future generations’; ‘promoting equitable access to water’; ‘promoting the efficient, sustainable and beneficial use of water in the public interest’; ‘facilitating social and economic development’; and ‘protecting aquatic and associated ecosystems and their biological diversity’.<sup>35</sup> The NWA firmly enshrines these values in the water system by requiring that water is reserved for basic human needs and the ecological reserve before any remaining water resources can be allocated for other uses. This has been implemented in part 3 of the NWA, with section 16 obliging the Minister to determine the size of the Reserve, which consists of the basic human needs reserve and the ecological reserve. The basic human needs reserve provides for the essential needs of individuals served by a water resource, including water for drinking, for food preparation and for personal hygiene, and the ecological reserve consists of the water required to protect the aquatic ecosystems of the water resource. The Minister must then determine the amount of water that is left to be allocated for other uses.<sup>36</sup>

To achieve an equitable division of water requires redress for past injustices, as water rights in South Africa have historically been allocated to specific ethnic groups. To operationalise the value that water must be distributed equitably, reallocation of water rights is necessary. In addition, it requires special attention to rural areas, which are likewise historically under-served. Consequently, the NWA contains a well-developed system for re-allocating water rights, which we will discuss in paragraph 3.6.

The IUCMA, as a public entity under DWS, also has a responsibility to strike a balance between different values and interests in conformity with the NWA and NWRS. This responsibility is documented in the IUCMA’s CMS, which includes the following list of values:

- We acknowledge the interdependence of our responsibilities for caring for the resource and there is explicit recognition of the diversity achieved by what each individual/group contributes to promoting equity, efficiency and sustainability;
- Decisions, actions and outcomes are subject to performance evaluation against measurable goals, indicators and timeframes;

<sup>35</sup> Alix Gowlland-Gualtieri, ‘South Africa’s Water Law and Policy Framework; Implications for the Right to Water,’ IELRC Working Paper 2007-03, p. 3.

<sup>36</sup> Dai, L., et al. (2018).

- We strive for a trusting, transparent and corruption-free system of catchment management that is cognisant of existing agreements and promotes fairness before the law and economic development;
- Management is adaptive, open to critique and outcomes driven, with solutions being practical, achievable and implemented.

Consequently, the IUCMA CMS has embraced SAM, which acknowledges the diverse values amongst all stakeholders and aims to integrate them. The values associated with water resources management have thus been well defined at a policy level in the Inkomati. The use of SAM by the IUCMA has also moved beyond policy and into actual implementation through its use in the adaptive operational water resources management of the Crocodile river basin.<sup>37</sup>

SAM's importance as a water management framework is best illustrated by the experiences during the 2015/2016 drought. Initially, the drought was causing the values and interests of stakeholder to change, as a notion of 'survival of the fittest' initially prevailed among water users.<sup>38</sup> This rhetoric was reinforced by the secretary of the Irrigation Board of the White River Valley, stating that: 'When there is a drought, people become monsters.'<sup>39</sup> When there is a lack of solidarity among water users, the role of the IUCMA and SAM are of even greater importance in order to ensure there is water for all. The efficacy of this role is reflected on in more detail in section 4.

This recognition of SAM and differing values, as well as the documentation of a common set of core values for water resources management at a policy level does not appear to have been accomplished in the greater InComati basin outside of South Africa, where the management of the resource has not moved beyond the promulgation of an interim treaty between the three countries.

### *3.2.2 Principles*

The NWRS sets out the guiding principles for water resources management in South Africa. The NWRS states that adaptive management must be adopted. The use of SAM by the IUCMA is thus in line with the principles in the NWRS. The CMA's must also draft a Catchment Management Strategy, which must contain a water allocation plan that sets out the principles for

<sup>37</sup> Jackson, B. (2014).

<sup>38</sup> (Interview with Joseph Mabunda, June 2016.)

<sup>39</sup> (Interview with Debbie Turner, June 2016.)

allocating water. However, while a water allocation framework has been completed by DWS, the water allocation plan has yet to be finalised.

Many further principles in the policy documents and implementation plans of DWS concern the misuse of water by its users and providers. Prevalent issues include unauthorised water use, illegal water tapping, poor maintenance of bulk distribution systems, reticulation and sewerage plants, and consequent water pollution.

In international environmental law, the polluter pays principle provides an instrument for ascertaining compensation in the instance of individuals or other parties polluting water resources. The polluter pays principle, together with the user pays principle, have been enshrined in the NWA and adopted in the NWRS and pricing policy of DWS. Payment for water resources management and water services is however not straightforward. The Minister can establish a pricing strategy that differentiates between geographical areas, categories of water users, and even individual water users. Water use charges are issued to fund the costs of water management, but the possibility of differentiation allows other objectives to be taken into account as well, like social equity and promoting equitable and efficient water use. If people fail to pay water charges, this can result in the restriction or suspension of their water supply, and authorisations to use water can be withdrawn.

Nonetheless, the principles are often deemed to be unenforceable in rural areas, considering the predominance of economically deprived people in these areas and slim means for legal prosecution being available. In addition, there is a feeling that water should be free, in accordance with an understandable but ultimately incorrect reading of the 'water for all' principle.

The principle of prosecution before the law also seems to be failing. While the NWA allows for the establishment of a water tribunal, this was not operational for several years and has only recently been re-established.<sup>40</sup> Furthermore, there appears to be a severe lack of resources within DWS to effectively implement the compliance monitoring and enforcement activities required to deal with unlawful water use and to support the tribunal. Lastly, the delegation of powers to perform these activities has been withdrawn from the CMA's, so they no longer have a formal role.

In the case of the international InComati basin, the International treaties<sup>41</sup> provide other principles that must be adhered to by the parties to the treaty

<sup>40</sup> Pejan, R., et al. (2013).

<sup>41</sup> The applicable treaties include the Piggs Peak Agreement, the treaty on the development and utilisation of the water resources of the Komati river basin (the Komati River Treaty) and the Interim Incomaputo Agreement.



including allocation limits and minimum flow requirements for transboundary flows and riverine ecology. The management approach that flow regimes are highly variable and should be managed accordingly is generally accepted in South Africa but is not enshrined in the international treaties. Consequently, there is disagreement on the cross border flows and their implementation. It is imperative that the parties participate and communicate over the operation of the rivers and the principle of consensus based decision making is thus important and should be adopted by all three countries.

In the context of South African water management institutions, devolution or decentralisation of water management is a central principle. The rationale behind this is that local governments are in the best position to make informed decisions, as they are closer to the actual water users.<sup>42</sup> This principle is reflected in the NWA, which strives to achieve integrated catchment management by means of decentralising and delegating certain tasks to the CMAs. Unfortunately, the delegation of some water resources management functions from the DWS to the IUCMA required to fully enable this decentralisation principle have yet to take place. Nonetheless, the IUCMA has still developed a sound constituency around water management practice at a regional scale.<sup>43</sup>

### *3.2.3 Policy Discourses*

In light of equity and redress, water management and political discourse are not solely related but also influence each other. Due to this relationship, water is placed within the political discourse of post-apartheid South Africa, where it is losing the competition for popular votes envisaging visible developmental progress, such as newly constructed roads. For example, many mining projects have been approved by the national Department of Minerals and Energy despite the lack of approval from the water and environmental authorities.<sup>44</sup> As a result, the funding for water related infrastructure development, operation and maintenance has steadily declined and many water distribution systems and waste water works are functioning very poorly.

<sup>42</sup> Centre for Environmental Rights, 'Water Supply and Sanitation in South Africa: Environmental Rights and Municipal Accountability,' *LHR Publication Series 1/2009*, p. 16.

<sup>43</sup> Riddell, E., et al. (2017).

<sup>44</sup> Interview with Marcus Selepe, June 2016.

### 3.3 Stakeholder Involvement

Public participation is a core value of current South African legislation. Enshrined in the Constitution, public participation is expected to support decision making from Parliamentary level down to local institutions. However, it is important to note the distinction between public and stakeholder participation.<sup>45</sup> The term “stakeholders” usually refers to a smaller subset of the ‘public’ with a clear, often sectoral, interest in the outcome of a decision making process, whereas the ‘public’ is referred to in the broader sense of ‘civil society’. The NWA refers to stakeholders, but falls short of providing a clear definition of stakeholder participation in water management. Nonetheless, Article 80 (e) of the NWA does provide that one of the functions of CMA’s is promoting community participation, which the authors deem to imply stakeholder participation. Moreover, SAM also reinforces the notion of stakeholder participation within water management in that it acknowledges that strategic management is continuously modified by stakeholders on the basis of shifting needs among water users. Stakeholder participation can lead to a sense of ownership of decisions leading to reduced resistance and even cooperation in implementation.<sup>46</sup> In complex systems such as river basins, stakeholders must thus be part of deriving management solutions since this is where and how they learn. If they are excluded, the ‘system’ does not learn and hence cannot adapt to change and surprise.<sup>47</sup>

Within the Inkomati, stakeholder participation in water management crystallises out in catchment management forums (CMF’s), river operations committees, annual business plan and tariff consultation meetings, irrigation board meetings and several other related forums such as the Mpumalanga Wetland Forum. During CMF’s, all generic management strategy decisions are discussed, ranging from financial expenditure to water quantity and quality.<sup>48</sup> These forums enable the CMA’s to generate input from the broader public concerning their ongoing management strategy.

However, the further need for the IUCMA to engage with a smaller set of stakeholders around the operational water management led to the establishment of the Crocodile Catchment Operations Committee (CROCOC),

<sup>45</sup> Holmes, T., & Scoones, I. (2000). *Participatory environmental policy processes: experiences from North and South*.

<sup>46</sup> JC Thomas (1995). *Public Participation in Public Decisions: New skills and strategies for public managers*. Jossey Bass Publishers. San Francisco.

<sup>47</sup> Du Toit, D., & Pollard, S. (2008). Updating public participation in IWRM: a proposal for a focused and structured engagement with catchment management strategies. *Water SA*, 34(6), 707–713.

<sup>48</sup> Interview Joseph Mabunda, June 2016.

reporting to the greater catchment forum, as the consultative technical advisory body for operational water resources managed by the ICMA. It provides the mechanism for interaction, exchange of operational information and coordination of operational activities and decisions. The value of this engagement mechanism is highlighted by Riddell et al (2017),<sup>49</sup> who evaluated the performance of the Crocodile river during the recent 2015 to 2016 drought by using simple flow metrics to assess the performance of the river against previous major droughts in terms of meeting the ecological reserve. They found that the river performed slightly better in meeting the ecological reserve than in previous droughts, despite this drought being the worst on record. Riddell et al attributed much of this to the preceding years of trust building by the KNP and IUCMA through their SAM framework and processes, which had established the IUCMA as the legitimate technically able institution to oversee these operational decisions in the eyes of all stakeholders by the time of this drought.<sup>50</sup> The CROCOC platform was especially vital in enabling the effective implementation of operational decisions during the drought. The openness and transparency in decision making to all CROCOC members via the IUCMA coupled with the feedback loops, and consequent accountability further enhanced the legitimacy and ability to implement restrictions. The nurtured social processes as revealed through the relatively smooth decision making relationships now at play in the Crocodile basin exemplify the trust building role that the CMA's can play in the South African water management context.

It is a remarkable outcome, considering that this has been the worst drought on record, and is probably an effect of the SAM implementation and extensive stakeholder engagement processes. The Inkomati basin did not approach 'day zero' nearly as quickly as for example the Cape Town region did in 2018.

Irrigation board meetings and forums solely provide information to agricultural water users under the mandate of an irrigation board of the area concerned. Considering that irrigation boards predominantly have competencies which concern operational activities, such as managing the day to day water allocations of its members, stakeholder involvement in this domain is limited to disclosing practical information. Nonetheless, irrigation boards play a relevant role in engaging locals in water management tasks. For example, the post 2015 to 2016 drought evaluation conducted by Riddell et al. (2017) determined that the Crocodile Irrigation Board, through the

<sup>49</sup> Riddell, E., et al. (2017).

<sup>50</sup> Jackson, B. (2014).

commitments made in the CROCOC, used its influence to ensure that the Crocodile River kept flowing to the confluence with the Komati River and thereby ensured cross-border contributions to Mozambique. In so doing it informally reported some challenging altercations with individual users who were effectively impeding the river's flow significantly, and thereby were also challenged in their own relationships with constituents to achieve 'bigger picture' objectives.

Stakeholder involvement varies in levels of significance to different stakeholder groups. In the IUCMA area, due to the dichotomy in urban and rural areas, different groups involve themselves through different channels. Where in general Historically Disadvantaged Individuals (HDIs) without farms refrain from involving themselves in stakeholder activities, commercial farmers and emerging farmers are actively involved.<sup>51</sup> The most reoccurring demographic within stakeholder involvement is the group of white males over the age of 45.<sup>52</sup> Additionally, industry, such as RCL Foods, is heavily involved in stakeholder activities, for example by means of placing the head of the internal water division on the board of an irrigation ward.<sup>53</sup> The Kruger National Park is also heavily involved as it seeks to protect the environmental sustainability of its rivers, which originate outside of the park.

### **3.4 Trade Offs Between Social Objectives**

Water legislation and policy in South Africa is founded on the principles of Integrated Water Resources Management, encompassed by the three main principles in the NWA of equity, sustainability and efficiency. The NWRS further defines the goal, objectives and guiding principles for water resources management and states that it is necessary to interpret these principles in the context of a developmental state and to recognise the linkages across the entire value chain from resource to tap. This is further reinforced in section 27 of the NWA, which requires the consideration of various trade-offs such as the need to redress past discrimination, socio-economic impacts, efficient and beneficial use, the impact on other water users, the availability of the resource and the quality of the resource in the evaluation of all water use license applications.

<sup>51</sup> (Interview Debbie Turner, June 2016; interview Marten Slabbert, June 2016.)

<sup>52</sup> (Interview Diketso Khaile, June 2016.)

<sup>53</sup> (Interview Dawie van Rooy, July 2016.)

The recognition of the need for trade-offs between social, economic and environmental objectives is thus well established in South African water legislation and policy. However, there is little evidence of this in practice. The approval of water use license applications has not been delegated to CMA's and is consequently considered with a top down approach and influenced by politics, contrary to the principles of the legislation. For example, a recent high court case<sup>54</sup> in South Africa led to the Minister of Water and Sanitation being instructed by the court to issue a water license that had been refused by DWS, as the court deemed that DWS had not properly evaluated the license against all of the factors in section 27(1) of the NWA. The court stated that the minister had only considered the need for redress in the refusal and that this was not acceptable.

Fortunately, the IUCMA SAM framework for the operational management of the Crocodile River, which adopts consensus based decision making with relevant stakeholders, seeks to achieve a balance between the social, economic and environmental needs in the operational management of the Crocodile River through the frequent and focused discussions of the CRO-COC. A Social Learning questionnaire conducted by the IUCMA revealed that these stakeholders at least, are currently satisfied with the trade-offs and decision making relating to the operational flow management of the Crocodile River.<sup>55</sup> However, the achievement of this balanced trade-off was not quick or easy. For example, the first few meetings of the CRO-COC showed that the effective determination and implementation of the ecological flow requirements were the main concern and source of conflict amongst the stakeholders. Prior to the commencement of the CROCOC and SAM framework, no ecological flows were being implemented even though international and ecological flow requirements have the highest priority of supply in terms of the NWA. This problem was also an important outcome of The Shared Rivers Initiative Phase I: Towards the sustainability of freshwater systems in South Africa<sup>56</sup> and was not solved in 2013.<sup>57</sup> In fact, the implementation of the ecological flow requirements has not been achieved in the vast majority of South African rivers and this was a cause for serious concern for the KNP at the time. These concerns and outcomes were then presented and discussed at the CROCOC meetings with all stakeholders

<sup>54</sup> *Goede Wellington Boerdery (Pty) Ltd v Atwell Sibusiso Makhanya N.O. and The Minister of Water and Environmental Affairs*. Case number 56628/2010. North Gauteng High Court. 19 August 2011.

<sup>55</sup> Jackson, B. (2014).

<sup>56</sup> WRC Report No. TT 477/10.

<sup>57</sup> Pejan, R., et al. (2013).

between October 2009 and October 2011 before an effective and trusted real time ecological flow requirement determination method and related decision making process was finally agreed between all stakeholders and implemented. The eventual resolution of the conflict by consensus demonstrates the importance of facilitated discussion amongst all stakeholders on matters of conflict and the time it can take to achieve consensus, but that the result can be much improved trust and ability to implement the decisions.

Political Discourse also has a negative impact on the trade-offs between social, economic and environmental needs, especially in the issuing of authorisations for mining activities.

### **3.5 Responsibility, Authority, Means**

#### *3.5.1 Responsibility and Authority*

The NWA regulates the provision of competencies to government authorities involved in water management and the division of competencies between these authorities.

Upon establishment, CMAs had relatively few competencies compared to the Minister of Water and Sanitation, inter alia advising interested persons on water resource matters, establishing a CMS, and presiding over the participation of stakeholders. The NWA also directly confers the competencies to prevent and remedy the effects of pollution and the control of emergency incidents to the CMAs. Remaining competences, such as the competence to authorise water licenses, draft regulations or provide financial assistance, all initially belong to the Minister of Water and Sanitation and its corresponding Department. The Minister may confer – and has conferred – some of these competences through assignment or delegation to the IUCMA. Hence, the Minister and the IUCMA are jointly accountable for water resource management within the catchment area.

However, the IUCMA may face legal challenges regarding the implementation of some of its conferred functions. Many of the functions currently conferred have been worded as delegations in the government gazette, and not as an assignment, whereas the NWA requires them to be assigned.<sup>58</sup> It is this confusion that may cause decisions that the CMA's make related to these conferred functions to face legal challenge.

A further challenge facing the IUCMA is that several of the previously conferred competencies were repealed by the minister in December 2015,

<sup>58</sup> See also Pejan, R., et al. (2013).

among them the competence to verify existing lawful water use. Nonetheless, the IUCMA has continued to carry out these activities, without its required legal competence. Proceeding with these activities is illustrative of a perceived responsibility towards implementing the NWA, but exercising legal power in the absence of adequate legal competences could be facilely challenged in court.

Additionally, municipalities are regulated by the Water Services Act and carry the responsibility to distribute water abstracted from the resource to their stakeholders, treat all waste water generated within their area of responsibility and return the waste water back to the resource at a quality defined by the NWA. Yet the water quality in the rivers is steadily degrading and a major source of the degradation stems from the waste water discharges of the municipalities.<sup>59</sup> In addition, the recently completed water requirements and availability reconciliation strategy for the Mbombela municipal area<sup>60</sup> highlighted the fact that the municipality is abstracting significantly more water per capita than the accepted international norms with significant losses, yet are requesting authorisation to pump even more, while the available resource is under significant stress. These two issues might harbour tensions between the IUCMA and the municipality and are an example of the difficulties faced by the IUCMA in coordinating the implementation of its own responsibilities with the implementation of other applicable development plans and acts. This cooperative governance responsibility is currently poorly implemented at the IUCMA and influenced by political interference.

### *3.5.2 Means*

Other than the delegated competencies, the IUCMA has employed several alternative means to implement its CMS as a result of the incomplete delegations and the realisation that a capacity gap exists within DWS to implement the NWA. These include agreements reached with certain divisions of the DWS at regional level to assist them with some of their functions, which the DWS lacks the capacity to perform, especially in the implementation of the operating rules for rivers; the use of Memoranda of Understanding and attempts to be appointed as an implementing agent of DWS for certain competencies. The NWA is also fairly new with little case history in court and many of the clauses are thus open to legal interpretation. This has been

<sup>59</sup> (Interview with Marcus Selepe, June 2016.)

<sup>60</sup> DWS (2013), *Water requirements and availability reconciliation strategy for the Mbombela municipal area*.

used by the IUCMA to conduct some of its work based on assumptions about the interpretation of the act.

Employing alternative means might pose future legal issues. Although the Minister is currently working on addressing the lacunae in competences, when this resolution will be presented remains unknown. Concerning the relationship between the IUCMA and the municipalities, political discussions have been employed in order to diffuse the tensions, and to forge effective solutions.

### **3.6 Regulation and Agreements**

The foundation of the South African legal framework on water is found in sections 27 and 24 of the Constitution, which contain the right of access to sufficient water for everyone in South Africa and the right to a healthy environment. The second paragraph of section 27 adds that the state has to ensure the progressive realisation of this right, by means of legislation and policy measures. In addition, section 25(8) of the Constitution mentions the need for land and water reform in order to redress the results of past discrimination. To give effect to these constitutional provisions, South Africa has two important statutes on water law: the 1998 National Water Act (NWA), which was internationally acknowledged for its forward-thinking character,<sup>61</sup> and the 1997 Water Services Act (WSA). The NWA regulates subjects like water resources management, the provision and distribution of competences to water authorities and the distribution and allocation of water authorisations.<sup>62</sup> The Water Services Act regulates municipal water supply and sanitation services.

The legal framework aims to meet basic human needs, to promote equitable access to water as well as the efficient, sustainable and beneficial use of water, and to facilitate social and economic development and growth. At the same time, it aims to protect aquatic and associated ecosystems, and to reduce and prevent pollution and degradation of water resources. On an institutional level, it aims to establish suitable catchment management institutions and to ensure that these have appropriate community and racial gender representation.

The legislative framework contains several instruments to achieve those aims. The WSA guarantees the constitutional right to water, by providing

<sup>61</sup> J. Brown, 'Assuming too much? Participatory water resource governance in South Africa,' 177 *The Geographical Journal* (pp. 171–185) 2011, p. 171.

<sup>62</sup> As is expressed in the preamble and section 2 of the NWA.



the right of access to basic water supply and basic sanitation. In case of shortages, section 5 requires municipalities to give precedence to basic supply and basic sanitation before allocating water for other purposes. Section 3 tasks water service institutions and water service authorities with taking reasonable measures to achieve these aims. The WSA also recognises limitations to these rights. Water shortages, failure to comply with water use conditions, or failure to pay water charges can all be reasons to terminate services. However, not paying water charges cannot result in termination of water services to cover basic supply and basic sanitation if one is able to show an inability to pay. This illustrates how the WSA is balancing potentially competing values and principles, like the right to water for all and the need to ensure an efficient allocation of water resources through the use of water charges.

Water service authorities license and monitor water service providers, who are the ones actually providing water to customers. Water service providers are obligated to provide their water service authority with any relevant information it requests. Water service authorities themselves are likewise subject to a number of transparency obligations, and are required to lay down their policies in water plans and bylaws. The WSA thus reflects the importance attached to gathering water knowledge and sharing this knowledge with a wide variety of stakeholders.

The constitutional obligation of progressive realisation of the right to water finds further expression in the legal framework of the NWA. Many of the NWA's provisions state that water resources should be distributed in an equitable way, and that water managers should seek to redress the results of past discrimination, and this is a main aim of the NWA.<sup>63</sup> To ensure this aim can be achieved, the NWA contains a nuanced system for allocating water use rights.

When allocating water rights, responsible authorities must take into account all relevant factors, including existing lawful water use, the need to redress past racial discrimination, efficient and beneficial use of water in the public interest, the socio-economic impact of the water use or the refusal to authorise the water use, and the likely effect on water resources and other water users.<sup>64</sup> Authorisations are generally provided with a limited duration of 20 or 30 years, which makes it possible to re-allocate water rights even-

<sup>63</sup> For instance, sections 2, 27, and 45 NWA.

<sup>64</sup> Section 27, NWA.

tually.<sup>65</sup> Licenses are also subject to review.<sup>66</sup> That means that after a certain amount of time has elapsed, the responsible authority can review the license, and is authorised to change the conditions of the licenses and the amount of water allocated.

This may not offer enough room to meet the objective of redress though, and indeed, a more far-reaching instrument has been included in section 43 of the NWA. This provision tasks DWS with the implementation of the Water Allocation Reform (WAR) programme. When it is desired that water uses are allocated fairly and equitably within a water-stressed area, a compulsory licensing procedure will be held. In this procedure, all interested water users in a designated area have to apply for a water use license. When the authority has received all applications, it proposes an allocation schedule, which should take into account current water entitlements and water uses, and imbalances in access to water that are a result of past discrimination. With the compulsory licensing procedure, access to water can be reallocated in an equitable way, which can benefit the victims of past racial and gender discrimination. The verification process also emphasises the importance of water knowledge. Existing water use must be mapped to successfully implement the WAR, if only because existing water use is one of the factors that must be taken into account when drafting an allocation plan. In the Inkomati catchment, the verification is currently being carried out by the IUCMA, which feels responsible for the process as well as being well-suited to carry out the work. DWS has not been able to successfully conduct the verification process in the Inkomati catchment.

The assessment method stresses that the legal framework must ensure decision-making at the most appropriate level.<sup>67</sup> However, many powers must first be allocated by the Ministry before CMAs can actually exercise them. These powers were indeed delegated to the IUCMA on 15 January 2015. However, they were withdrawn shortly after on 12 December 2015. The withdrawal of these powers may not reflect the spirit of the NWA or the principle of devolution of power: the Minister *must* promote the management of water resources at the catchment management level by assigning powers and duties to CMAs when it is desirable to do so.<sup>68</sup> In practice, although the NWA certainly enables decision-making at the most appro-

<sup>65</sup> (Interview with Johan Boshoff.)

<sup>66</sup> Section 49 of the NWA.

<sup>67</sup> Van Rijswijk et al. (2014). Ten building blocks for sustainable water governance – an integrated method to assess the governance of water. *Water international*, 39 (5), (pp. 725–742) (18 p.) p. 734.

<sup>68</sup> Section 73(4) NWA.

ropriate level, it fails to ensure that this actually happens. The criteria for delegating powers to the CMA lack clarity, and do not ensure that CMA's capable of executing these powers will actually receive them. Instead, the question of whether to delegate remains a political one.

### **3.7 Financial Arrangements**

The budgeting, funding, expenditure control, billing and revenue collection for water resources management in South Africa is guided by the NWA, the National Pricing Strategy for Raw Water Use Charges (which allows for free basic water), the Public Finance Management Act 1 of 1999 and the National Treasury Medium Term Expenditure Framework guidelines, 2015. The financial arrangements for water services and water service charges are further guided by the Water Services Act.

Regarding funding for water resources management, the NWA states that a CMA must be funded by money appropriated by Parliament; water use charges; and money obtained from any other lawful source. The national pricing strategy splits the water use charges into several different charges, of which only the water resources management charge is applicable to CMAs. This creates a split responsibility between DWS and CMAs for the collection of revenue for different water resource management functions. The pricing strategy also caps the amount by which the charge can be increased each year, hindering the ability to get more funding from this source.

The billing and revenue collection of the water resource management charge is currently done by DWS on behalf of the IUCMA and the cost recovery rate is currently at 53% (IUCMA APP, 2016), which has a significant negative effect on the funding of the IUCMA. Billing is done based on information in the Water Authorisation and Registration Management System (WARMS), which the ongoing IUCMA project to verify the extent and lawfulness of all existing water use has shown is not up to date. Effective billing will not be feasible until the WARMS database is up to date.

Fortunately, the ability to explore other lawful sources of funding encouraged the IUCMA to adopt a research focus in order to bring in further funds, as research and other funding agencies often prefer to fund research conducted collaboratively with relevant institutions, since this increases the chances of research outcomes being adopted in practice. The IUCMA has thus participated in and co-funded several research based projects related to its activities and continues to encourage and participate in research. This has led to several positive outcomes in practice. For example, such a col-

laborative research led to the SAM Framework now being implemented by the IUCMA.<sup>69</sup>

### **3.8 Engineering and Monitoring**

Monitoring is essential to SAM. The adaptive nature of the approach requires the water manager to be aware of the status of the basin. To organise the required information, SAM uses the V-STEEP framework (Values of Social, Technical, Economic, Ecological and Political indicators).<sup>70</sup> Thus, monitoring must not be limited to technical and ecological factors, but should include social, economic and political factors as well. Strategic Adaptive Management and appropriate monitoring techniques can then facilitate compliance with legal standards and agreements in an unpredictable environment.

The IUCMA has extensive monitoring of the resource in place and it is generally sufficient. However, the monitoring of actual water use is not adequate. Most water use abstractors are not metered, and their abstractions can only be estimated. The monitoring of effluent discharge into the resource is also not directly monitored. There is insufficient budget available to the IUCMA to fund any new monitoring related infrastructure projects such as the installation of water meters or the construction of measuring weirs, limiting the ability of the IUCMA to further improve its monitoring programme beyond the current resource monitoring to include actual water use monitoring. As a result of this limited funding for monitoring, progress is being made in alternative and cheaper solutions where feasible, such as remote sensing data sources and cloud based software as a service (SaaS) subscription platforms. For example, the IUCMA subscribes to the Dutch SaaS platform called HydroNET ([www.hydronet.com](http://www.hydronet.com)). This platform is providing forecasted and observed radar and satellite derived weather and evapotranspiration data to the IUCMA, and has also recently expanded into the neighbouring countries of Swaziland and Mozambique, enabling those countries to view and access the weather and water resources data of the IUCMA. A Water Auditing application has also been developed within HydroNET to estimate irrigated water use with remotely sensed evapotranspiration data. This adoption of HydroNET is an example of state-of-the-

<sup>69</sup> Jackson, B. (2014).

<sup>70</sup> Pollard, S., H. Biggs, and D. R. Du Toit (2014). A systemic framework for context-based decision making in natural resource management: reflections on an integrative assessment of water and livelihood security outcomes following policy reform in South Africa. *Ecology and Society* 19(2): 63.

art development necessitated by a lack of funding and is an exciting new aspect of engineering that modern advances in Information and communication technologies are enabling.

The responsibility to consider large infrastructure to increase the yield of regional water resources sits with DWS and they follow a procedure of reconnaissance, pre-feasibility and feasibility studies before commencement of any infrastructure development. These processes include the evaluation of other reconciliation options and trade-offs etc. DWS conducted a reconnaissance study for the Crocodile catchment in 2008 that indicated the need for further storage and which was unanimously supported by all stakeholders involved. Unfortunately, no further progress has been made since, despite the NWRS, CMS and several other studies like the Mbombela Reconciliation Strategy (DWS, 2013) indicating the severely stressed nature of the catchment and the urgent need for further storage. This lack of progress has led to the establishment of the Crocodile Catchment Development Action Committee (CROCDAC) by the IUCMA. This committee includes all major stakeholders and aims to lobby the minister of DWS to urgently continue the process to investigate and build a further dam in the Crocodile.

Further constraints are imposed on large scale infrastructure developments by the international treaties with Mozambique and Swaziland. For example, the Piggs Peak Agreement signed with Mozambique in 1991 states that South Africa may not construct any new water works with storage capacity in excess of 250 000 cubic metres without prior consultation. This elevates the importance of trans boundary cooperation for South Africa while joint water commissions and committees between the three countries have been officially established, they are not necessarily functioning effectively.

The state of local farm scale infrastructure is very varied, but is generally in a very poor condition for most emerging and historically disadvantaged farmers and in need of urgent refurbishment or upgrade.<sup>71</sup> These farmers lack sufficient skills and resources to remedy the infrastructure on their own and consequently find themselves in dire economic circumstances from which they are unable to escape. Many of them also require storage dams to improve the reliability of supply from the resource to acceptable levels for commercial farming and although subsidies for resource poor farmers are included in the pricing strategy and available from DWS, these are proving difficult to access by those farmers<sup>72</sup> and government does not appear to be doing enough to support these farmers.

<sup>71</sup> (Interview with Martin Slabbert, June 2016.)

<sup>72</sup> (Interview with Martin Slabbert, June 2016.)

In some cases, industry itself is attempting to rectify the situation of the resource poor farmers. For example, the sugar mills in the Crocodile and Komati Rivers have set up a company, TSGrow, specifically to assist resource poor sugar cane farmers to become more productive as the mills get much of their sugar cane from these farmers and they are not producing effectively, which is economically unsustainable for both the mill and the farmers.<sup>73</sup> However, they also need further funding and are looking to the IUCMA and government to assist.

### **3.9 Enforcement**

Enforcement is often forgotten, but is in fact a critical issue in the policy process.<sup>74</sup> In the Inkomati catchment, compliance does not come easy: problems with illegal water abstraction and water pollution are persistent.<sup>75</sup> The preliminary data from the ongoing IUCMA project to verify the extent of existing lawful water use indicates that as many as 1 607 out of a total of 4 333 water users may be using some or all of their water unlawfully. That is 37% of all water users. This is an alarming figure that highlights the urgent need for effective compliance monitoring and enforcement.

In addition, there are problems with water pollution caused by mining and industrial activities, as well as rural communities that tend to throw their waste near river banks or into the water due to the poor state of the water service infrastructure and a lack of suitable garbage disposal methods. Resolving the above-mentioned issues concerning illegal water connections and water pollution requires regulation, compliance monitoring and enforcement of the legal rules.

Stakeholders in water management are more inclined to comply with rules that reflect shared values and principles.<sup>76</sup> In theory, this bodes well for compliance with water law, which embraces a plurality of values that are widely shared. However, in practice the picture is less rosy. Little progress has been made since the enactment of the NWA in terms of redressing past racial and gender inequities. Only 1 518 of the 4 284 licenses between 1998 and 2012 for new water rights were allocated to historically disadvantaged individu-

<sup>73</sup> (Interview with Martin Slabbert, June 2016.)

<sup>74</sup> Pejan, R., et al. (2013).

<sup>75</sup> N. Quinn, 'Water governance, ecosystems and sustainability: a review of progress in South Africa,' 37 *Water International* (pp. 760–772) 2012, p. 765.

<sup>76</sup> Van Rijswijk et al. 2014, p. 737.

als and the amount of allocated water was merely 1.6% of the total.<sup>77</sup> This failure to achieve more equity has led to tensions among farmers who feel treated unfairly and may be a trigger for illegal conduct.

Another common cause of frustrations concerns politicians promising people free access to drinking water, without having the means to realise these promises. Settlements grow rapidly and oftentimes there are not enough water connections to the water systems. As people feel they are entitled to free drinking water, they connect to the system illegally. An exacerbating factor for non-compliance is the severe water scarcity that occurs during drought periods. In such times, illegal water abstraction is an attractive option to keep the business going.

Besides the causes described above, many farmers are uninformed about the rules, the possible consequences of their (illegal) conduct and the damage that may result from it. In terms of water pollution, individuals may not be informed about the (health) consequences of disposing waste near or into rivers.

In addition to the quality and the nature of the rules, which can affect compliance, it is necessary that responsible authorities have sufficient tools for enforcement. Again, on paper, there are ample enforcement tools available.<sup>78</sup> Both illegal pollution and illegal water use lead to criminal liability. Moreover, where a private actor commits an act that causes water pollution, a violation of section 24 (a) Constitution may be alleged.<sup>79</sup>

Where a person does not adhere to the conditions set out in the NWA or uses water (in the sense of the NWA) without authorisation, the NWA provides administrative measures to enforce compliance under sections 53–54. CMAs can also take a more hands-on approach. According to section 19 NWA, CMAs may take measures to remedy situations of water resource pollution and can subsequently recover the costs from the polluter.

<sup>77</sup> M. Kidd, 'Water Rights and Permitting: A South African approach,' in A. Rieu-Clarke, A. Allan & S. Hendry (eds), *Routledge Handbook of Water Law and Policy* (2017) [PROOF], p. 44.

<sup>78</sup> Under section 151(1)(d) and (e) NWA, no person may 'fail to comply with any condition attached to a permitted water use' or 'unlawfully and intentionally or negligently temper or interfere with any water work or any seal or measuring device attached to a water work'. Section 151(2) stipulates that any person who contravenes what is stated in subsection (1) is guilty of an offence and liable to a fine or imprisonment or both.

<sup>79</sup> See *Hichange Investments (Pty) Ltd v Cape Produce Company (pty) Ltd/ a Pelts Products and Others*, Eastern Cape Division, Judgment of 20 November 2001, All SA 636 E 658, § 34; see also L. Feris, 'The Public Trust Doctrine and Liability for Historic Water Pollution in South Africa,' 8 *Law, Environment and Development Journal* 2012 (pp. 1–19), p. 16.

Although on paper there are clear rules that regulate water abstraction and water pollution, the implementation of these rules leads to enforcement gaps. Not all enforcement powers are currently conferred upon the IUCMA, which would be the most suitable authority to use these powers effectively. After the withdrawal of its delegated powers in 2015, the IUCMA lost a number of important enforcement tools to DWS. This inter-institutional struggle between the central government and the catchment agency is one of the most pressing issues that weaken the existing enforcement mechanisms. As a result, the agency's capacity to perform the tasks it has been entrusted with and its ability to enforce the rules on water allocation have been seriously impaired.

Another institutional obstacle to proper enforcement is the lack of appropriate coordination and cooperation between river basin management and the management of water services. These two aspects of water management are being handled by different authorities: the first by the central government and the CMAs, the latter by the municipalities. Water resource management and water services are, however, strongly intertwined, which necessitates strong bridging mechanisms.<sup>80</sup>

The lack of formal powers to enforce rules on water use triggered the development of alternative – often more informal – enforcement mechanisms which do not necessarily involve the government. Examples are: incentivising compliance by highlighting good practices and praising good behaviour, naming and shaming, knowledge sharing, stakeholder involvement and strengthening the water service sector. Some of these options are already being applied, others are suggestions to stimulate compliance without relying solely on the current statutory enforcement mechanisms.

Several entities have committed themselves to these tasks – including private individuals, organisations and businesses and bodies such as the Crocodile forum. The forum particularly engages in the identification of good practices, naming and shaming and stakeholder involvement. The driving force behind the forum are private individuals who are dedicated and determined to improve the local water management.<sup>81</sup> Even if the

<sup>80</sup> Gilissen, H.K., Alexander, M. Beyers, J-C, Chmielewski, P., Matczak, P, Schellenberger, T. & Suykens, C. (2016). Bridges over Troubled Waters – An Interdisciplinary Framework for Evaluating the Interconnectedness within Fragmented Flood Risk Management Systems. *Journal of Water Law*, 25 (1), (pp. 12–26).

<sup>81</sup> Theo Dormehl, the chairperson of the Crocodile forum, describes his activity as follows: 'Manage and chair the functions of the Crocodile River East Catchment forum to protect and ensure the river is sustainable for all the estimated 750 000 water users along the catchment. This includes all water user sectors commercial, domestic, agricultural in terms of our Constitution as guidance and with the terms of the Water Act.'



Crocodile forum is not intended as a vehicle for enforcement as such, it may take up a role to facilitate the process. The forum also serves as a platform for identifying illegal behaviour. There are no formal procedures that are being followed. Usually, the person is notified about his/ her wrongdoing and asked to stop by the chairperson of the Crocodile forum. If communication does not lead to compliance, the name of the offender is published in the local newspaper.

In terms of the WSA, when municipalities fail to meet their obligations, there are a number of different options for the national and provincial government to intervene.<sup>82</sup> Under section 63 WSA the Minister can request the province to take the duties of the water services authority upon itself in accordance with section 139 of the Constitution. If this fails to resolve the problem, the Minister can choose to execute the tasks of the water service authority herself. A municipality that fails to purify water intended for human consumption can be criminally offended. In addition, section 32 of the Municipal Finance Management Act renders a political office bearer or accounting officer who incurs unauthorised, irregular, fruitless or wasteful expenditure liable for such expenditure.

In practice, the Ministry is opting for softer enforcement mechanisms in the form of the so-called Blue Drop and Green Drop programs, highlighted in section 3.1. These programs rely on ‘naming and praising,’ and affirm good performance rather than merely pressuring municipalities that do not meet compliance requirements.<sup>83</sup>

To conclude, current water legislation provides ample tools for enforcement. These tools are, however, not used to their best effect. On the one hand this can be attributed to political struggles between the different levels of government. On the other hand, there is a certain reluctance to use the harsher instruments and a tendency to favour more informal tools of enforcement.

This ‘softer’ approach has some benefits: overcoming one of the key contributing factors to non-compliance – namely water user’s feeling that their values and interests are not taken into account by decision makers – requires an open conversation and the involvement of stakeholders. Such involvement may take the form of offering the opportunity to voice an opinion or even actively participate in the decision-making process. Where people

<sup>82</sup> Igotsson, Emma, et al. “Water Supply and Sanitation in South Africa: Environmental Rights and Municipal Accountability.” *LHR Publication Series (1/2009)*, funded by Developed Bank of South Africa (2009).

<sup>83</sup> K. Eales 2011, pp. 60–61.

feel that their interests and opinions are represented and their values are respected, they are more inclined to respect the law. Examples of successful stakeholder involvement include the Crocodile river forum, CROCOC and TsGro. They all succeeded in overcoming frictions among water users by bringing stakeholders together and openly discussing the issues.

### **3.10 Conflict Prevention and Resolution**

Because catchment management requires the reconciliation of a multitude of interests, conflict is always lurking. Thus, procedures for conflict prevention and resolution must be in place. To prevent conflict, it is important to identify the benefits of cooperation, and to move the focus of the conversation towards the value of water, rather than talking purely in terms of quantity.<sup>84</sup>

Section 6 of the Promotion of Administrative Justice Act (PAJA), gives any person the right to institute proceedings in a court or a tribunal for the judicial review of an administrative action. The range of actions – or lack thereof – that can be reviewed under the PAJA is extensive and includes reporting obligations resting upon municipalities and monitoring obligations resting upon national and provincial authorities.<sup>85</sup> In terms of the WSA, civil society can use the so-called mandamus procedure (obtain a court order compelling an administrative agency to act in terms of a power created by statute where it is reluctant or failing to act – a common law procedure) to ensure that the provincial and national government exercise their supervisory powers.<sup>86</sup>

Section 8 of PAJA stipulates the available remedies. The court can order the administrator to give reasons for its decision, to act in a particular manner, or to refrain from acting in a particular manner. It can set aside an administrative action and order the administrator to reconsider, taking into account any directions the court gives. In exceptional cases, the court can substitute its own decision for that of the administrator, order the administrator to pay compensation, or issue a declaration of rights. The court can also grant a temporary interdict or temporary relief, and can decide on the cost of the procedure.

In addition to the PAJA, parties to a conflict can demand constitutional review of government (in)action, as the right to water is enshrined in the Constitution. The potential of this avenue is somewhat limited, because the

<sup>84</sup> Van Rijswijk et al. 2014, p. 738.

<sup>85</sup> Algotsson et al. p. 6.

<sup>86</sup> Algotsson, et al. 2009, p. 5.

Constitutional court uses a reasonableness approach to rule on the right to water. It does not recognise a minimum core that must, under all circumstances, be recognised.<sup>87</sup> Thus, authorities must take reasonable action to promote the right to water, but are under no obligation to provide a minimum amount of water. However, constitutional review still has its place as a tool to stimulate public authorities to re-evaluate their policies and to stimulate public discourse.<sup>88</sup>

Thus, with the PAJA, common law actions and constitutional review being available, stakeholders have sufficient opportunity to challenge the administration when they disagree with decision in relation to water management.

However, conflict resolution is only half the equation. SAM also emphasises stakeholder participation, value-centred dialogue, and fostering an understanding between different interests. A prime example of the value of this approach to effective conflict resolution can be found in the CROCOC and its adoption of consensus based decision making around the operations of the flows in the Crocodile river (see paragraphs 3.3 and 3.4).

#### **4. Analysing the results of the assessment**

The analysis of water governance in the InComati shows the advantages of SAM as well as gaps in performance of both the individual assessment criteria as discussed in the several blocks as well as between content, organisation and implementation. It touches upon general discussions on the complexity of water governance,<sup>89</sup> the necessity of participation in water management,<sup>90</sup> the need for connectivity in water governance,<sup>91</sup> and the need to improve bridging mechanisms in order to deal with multi-level, multi scale, multi sector and multi actor governance.<sup>92</sup>

<sup>87</sup> *Mazibuko and Others v City of Johannesburg and Others* (CCT 39/09) [2009] ZACC 28.

<sup>88</sup> Danchin, Peter. "A human right to water? The South African Constitutional Court's decision in the Mazibuko case." *EJIL: Talk! Blog of the European Journal of International Law* (2010).

<sup>89</sup> Pahl-Wostl, C., et al. (2012). Quevauviller, P. (2010); Rijke J., et al. (2012).

<sup>90</sup> Blackstock K, Waylen K, Dunglison J, Marshall K (2012) Linking process to outcomes—internal and external criteria for a stakeholder involvement in River Basin management planning. *Ecol Econ* 77:10; Newig J, Fritsch O (2009) Environmental governance: participatory, multi-level – and effective? *Environmental Policy and Governance* 19:18.

<sup>91</sup> Adger W, Arnella N, Tompkins E (2005) Successful adaptation to climate change across scales. *Glob Environ Chang* 15:10; Edelenbos J, Bressers N, Scholten P (2013) *Water governance as connective capacity*. Ashgate Publishing Limited, Farnham.

<sup>92</sup> Gilissen, H.K., et al. (2016).

The InComati is a stressed basin suffering from threats to water quality, because of a lack of -inter alia – coordination between waste water management and water resources management, as well as from water scarcity, because of a higher demand than the available amount of water and a lack of coordination with drinking water supply. Overall water system knowledge is in place and there are strong incentives to gather knowledge both from knowledge and governmental institutions, private parties such as Hydronet as well as from society by means of participation in knowledge gathering and sharing. Legal monitoring obligations and auditing programs are in place. The IUCMA goes above and beyond what is common in improving water system knowledge by analysing knowledge needs of stakeholders.

South Africa's water governance is highly value-driven, which is reflected in all assessments blocks. The belief in equality and the wish to correct former inequalities, and to guarantee 'water for all' is leading in water governance, from policy making, the institutional design as well as the implementation. However, the effectiveness is hampered by policy discourses that are sometimes conflicting. Examples are the conflicting priorities with other policy sectors, including water services, a lack of means and the time needed to implement these equality policies. Short term political gains may hamper long time sustainable water governance.

A remarkably positive effect of SAM is the strong role for stakeholder involvement. Stakeholder involvement is not only laid down in institutional and regulatory obligations and policies in place, but are leading in all elements or 'blocks' of the assessment method. Participation in knowledge gathering and sharing also improves awareness, involvement and support of water governance. The recent performance of the IUCMA in managing the rivers during the 2015/16 drought are testament to the value of the stakeholder involvement and consensus based decision making processes adopted through its SAM processes and by its committees.

While in general participation mainly focusses on the beginning of the policy cycle in the Inkomati, participation also plays an important role in compliance and enforcement, although mainly in an informal way and through positive incentives.

Generally speaking, South African water law meets the criteria of appropriateness and legitimacy. It reflects the values underlying water management and offers instruments to reconcile these values where they conflict. The institutional framework as envisioned in the WSA and the NWA, with its many institutions operating close to citizens, or actually being operated by citizens, reflect the values of community participation and local deci-

sion-making. However, the implementation of the law in this regard is weak. In addition, there are problems with the enforceability of the law.

The need to deal with trade-offs between the different social objectives is recognised. In the field of water governance respecting the human right to water, supporting the Sustainable Development Goals, the availability of enough and clean water for all, the insurance of the protection of environmental flows on behalf of the ecosystem and the need to address poverty and improve economic development for all groups in society puts this balancing of interests to the test, especially in a stressed basin. The legal framework explicitly provides room to balance different objectives and demands that different objectives are taken into account. It is again stakeholder participation that plays an important role when several interests have to be balanced. Awareness and a better understanding of the needs of both environment, people and business creates support for sustainable water governance.

The effectiveness of SAM is seriously hampered by the institutional design and the lack of connectivity between the several levels of government involved as well as the several sectors involved. Firstly, although decentralisation of water management is a leading principle in South Africa the shift of tasks and responsibilities for river basin management in the Inkomati river basin do not align with the shift of administrative powers and competences. There is confusion about competences to take legal action on the noncompliance with water legislation and water use permits, which hampers an effective management with regard to pollution control and the use and redistribution of water use rights to address former inequalities. Secondly, the coordination between water resources management and water services being competences of the IUCMA and the municipalities respectively should be improved to address the connectivity between the two policy fields. The interdependency of municipalities is too large and there are no bridging instruments available to close this gap.

There is a serious gap between theory and practice too. Although regulations in the field of water management are among the most sophisticated in the world and based on shared values, it can be concluded that legislation facilitates good water governance, but that the implementation in practice faces multiple challenges. This has to do with the political debate on trade-offs and priority setting, the incomplete decentralisation process, the lack of coordination between the different sectors involved and a general lack of means when it comes to educated staff especially in building and maintaining waste water treatment works and finally there is a lack of financial resources. Although there are possibilities to finance water management

both with central and local taxes, it's still a challenge to have everyone contributing to adequate and appropriate water governance.

The above mentioned problems that follow from this study come to the forefront in the enforcement of regulations and policies. Here we see a combined effect of the lack of connectivity between the several policy levels, the different policy sectors, the different priorities of the relevant stakeholders and the effect of actions at the very local community scale on the scale of the Inkomati basin as a whole. It follows from our study that SAM can remedy some of the consequences of this failure by focussing on stakeholder involvement and the use of informal approaches to overcome noncompliance and avoid or solve conflicts.

SAM is also a good way to improve the adaptiveness of water management. Its strong focus on monitoring and learning in order to constantly improve the performance is the core of adaptive management. However, although in the Inkomati monitoring and learning ranks positive on the assessment, the maintenance and follow up of monitoring results need to be improved.

## **5. Discussion and way forward**

In this study we assessed SAM as used in the Inkomati river basin by performing a desk study, interviews and a field visit. For the assessment we chose a method that supports a multidisciplinary approach and explicitly addresses the science-policy interface and the need for adaptive management. We combined water resource management and water services in our assessment to be able to show the lack of connectivity between sectors. Usually, the method is finetuned by focussing on a particular part of the water system or a specific problem in the field of water management. It was widely acknowledged during the field visit and the reflection of our findings at the Water Forum meeting that the results indeed showed the strengths and weaknesses of SAM in practice, as well as the gaps that need to be addressed in the near future to improve SAM. Acknowledging that water stress is high, priority should be given to weaknesses in the implementation phase, in particular with regard to the principle of decentralisation of powers and the connectivity between levels and sectors. SAM as applied by the IUCMA shows the importance of stakeholder participation, knowledge gathering and dissemination, and a broad public discourse on values and interests in all phases of the policy process as well as in the institutional design. Finally, the study shows the importance of taking a local approach.

To further improve SAM, the results of this assessment are useful to develop a decision support tool to assist water managers in making choices based on to be developed key performance indicators that help to address these challenges.