Lessons Learnt from the Establishment of Catchment Management Agencies in South Africa

Report to the
Water Research Commission

by

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EXECUTIVE SUMMARY

THE PROJECT FROM A CONTRACTUAL PERSPECTIVE

Based on a solicited call from the South African Water Research Commission (WRC) in the first half of 2013, a research project entitled “Lessons learnt from the establishment Catchment Management Agencies in South Africa” was awarded to a consortium led by the Centre for Water Resources Research (CWRR) at the University of KwaZulu-Natal (UKZN), the Council for Scientific and Industrial Research’s (CSIR) Water Governance Group and the Australian National University, Fenner School of Environment and Society.

The ultimate aim of South Africa’s legal framework is to establish Catchment Management Agencies (CMAs) in all water management areas (WMAs). But owing to implementation constraints within government, the effectiveness of catchment management is uncertain and the outcomes are difficult to analyse. Not only that, to involve all stakeholders in the inception phase of the two established CMAs proved more difficult than previously anticipated. With the significant lack of implementation in regards to CMAs it must be assumed that some type of vacuum exists in South Africa’s water related governance and management landscape. Therefore, his research project aims to gain more insight into the different processes and drivers around CMA establishment as well as operations, in order to understand outcomes and from there enable water governance to influence more successfully results and effects of CMAs.

The impacts of the research to emanate from this project are geared mainly towards understanding the successful operation of CMAs in South Africa. Thus, the impacts should have positive bearings on society, the economy, health and the environment. The expected research outcomes will propose some answers towards these regarding:

- Identifying key endogenous and exogenous challenges that have hampered the CMA establishment processes – understanding the different positive and negative impacts of the past establishment processes of the currently operating CMAs.
- Identifying key actors and processes that have played a facilitative role in the establishment of different CMAs processes.
- Establishing the causal links between the elements of the establishment process (e.g. actors and processes) and the successes and failures of the establishment process (performance and learning outcomes). By this identifying the lessons learnt.
- Assessment of tools and boundary objectives that have helped CMAs to create collaborative relationships with stakeholders and decision-makers.
- Develop guidelines how decision-makers may maximise the strengths and minimise the weaknesses within their specific establishment process.

As a result, the proposed research should create a repository of the processes pre- and post-establishment of the two CMAs under investigation and distil lessons learnt from the establishment as well as maturing process of CMAs. This will hopefully assist the current processes of CMA establishment to identify successful trajectories of development and operation.

THE PROJECT'S NARRATIVE AND ITS CHALLENGES

The above puts a strong emphasis on water governance as the canvas for water management and knowledge creation. It furthermore, suggests that future water governance frameworks need to include 'future politics' of synergized decision-making that adopt a broad and integrative approach to socio-economic development. It is within this domain that governments and governmental entities, such as CMAs, as legislated water resources management institutions start to play a pivotal role. CMAs have been designed to create that 'melting pot' of diverse knowledge and expertise drawing knowledge from stakeholders and practitioners. With the CMAs being rooted in the catchments they are serving issues of accountability and also trust building between government, industry, and civil society and the wider public respectively. This is why CMAs have been assigned a pivotal role in South Africa's water governance system and especially its overall reform and transformation process.

However, apathy towards the implementation of CMAs has spread among non-governmental and governmental stakeholders. The source of this apathy is mainly due to delays in establishing CMAs. The current initiative to push for the establishment of the nine newly gazetted CMAs (2013 and 2016 respectively) in a short and very structured approach has given hope to many that still believe in the great potential that CMAs would have for sustainable growth and development in South Africa.

Therefore, this study will focus on CMAs and specifically the lessons learnt from the seemingly successful establishment of the only two currently operating CMAs (i.e. the Breede-Overberg CMA [BOCMA] and Inkomati-Usuthu CMA [IUCMA]), as well as many other relevant processes linked to the establishment process that have occurred over the past 15 years within the South African water landscape. As CMAs can be understood as central actors in a specific water governance set-up (here on the scale of a catchment), we may draw on lessons learnt from their establishment. But these need to be seen and understood in their specific environmental, societal and historical context. Although the National Water Act (No. 36 of 1998), provides a broad framework of intent, CMA has evolved and changed according to broader societal learning and continuous improvement in the process accompanying implementation. These, including current functions, needed to be mapped as well. The documentation of the lessons learnt in the establishment

process, change and current functions will form the basis of a repository for future practitioners, stakeholders and interested and affected parties that are participating in similar processes and will hopefully inform such processes to be more efficient and successful.

THE RESEARCH CHAPTERS AND OUTCOMES RESPECTIVELY

The project team has taken a holistic approach in analysing the evolution of the CMAs by highlighting what challenges (exogenous and endogenous) and opportunities (e.g. building on existing collective action initiative, being supported by other bridging organizations, allowing champions and leaders to emerge, etc.) arose in each process, but also how the processes influence each other. For this a specific framework (*cf.* Chapter 2) has been developed that enabled the project team to gain a more rounded and holistic view of the realities of CMA establishment and operations. Furthermore, in order to gain insight into the historical dimension of establishment as well as evolvement over time of the different CMA processes, an analysis was performed leading to a timeline for both operating CMAs. This was achieved by exploring the interplay between policy-making, implementation and local water resources management (*cf.* Chapter 3). Including the perceptions and experiences of key water management groups will complement the findings, and we were able to understand the framing and enactment of roles and responsibilities in South Africa's water resources management (*cf.* Chapter 4). Furthermore, relations between actors – connected horizontal or vertical – characterize the interplay in more detail and resultantly provide insight into the influence of specific actors on the successes and also weaknesses of past experiences (*cf.* Chapter 5). A critical review on a potential bias based on existing discourses in the water sector of the recommendations to be developed was undertaken (*cf.* Chapter 6), which are followed in Chapter 7 by the recommendations for CMA establishment and operation. Chapter 8 concludes the report with some academic considerations on water management and water governance on a catchment scale.

Chapter 2: A framework to account for the causal relationships between the elements of South Africa's catchment management agency process and its failures and successes

CMAs are places of learning with a diversity of actors involved in the establishment and operational process. Because we are confronted with a wide variety of actors or agents from an assortment of institutional (e.g. DWS), material (e.g. emerging and commercial farmers from the agricultural sector) and ideational (e.g. scientific community and consultants) structures, an analytic eclectic[1] approach could be the most optimal way of

[1] Analytic eclecticism is not an alternative model to research such as the qualitative or quantitative methods. It is rather an intellectual stance that researchers can adopt when doing research that does not fit established research traditions in the form of paradigms and theories in a particular discipline or field (Sil and Katzenstein, 2010b).

capturing the knowledge about the lessons learn in such a complex environment. What this passage means is that if we would like to shed light on the question of the lessons learnt in CMA establishment, we should get rid of a priori assumptions about the nature of reality. 'Reality' comprised of agency, structure, material and ideational domains and the debate about which of these domains are more important in constituting reality. A framework assisting in capturing the lessons learnt thus, needs to take diverse institutional, epistemic, paradigmatic and theoretical as well as actor dynamics into consideration. The framework should also not be overtly rationalist or post-positivist and needs to cut across the entire paradigmatic spectrum incorporating rationalism, post-positivism, interpretivism/constructivism, critical theories and the participatory paradigm. Attention will also be given to the politics influencing events and decisions. To get to such a framework we incorporated elements from a number of theoretical frameworks. These included, but were not limited to the following frameworks:

- The theory of adaptive management and pragmatism utilised by Sabine Stuart-Hill from the University of KwaZulu-Natal.
- Pahl-Wostl *et al*.'s (2010) management and transition framework.
- A framework to analyse water politics and governance in river basins. This framework utilises a social constructivist lens (Meissner, 2014) and is therefore an interpretivist type theoretical framework.

The three frameworks, *viz.* adaptation to change, management and transition and agency in transboundary rivers, had been followed when a number of key questions were developed to capture the finer nuances of the lessons learnt. They have guided all inquiries, interview processes and conversations that have informed the final lessons learnt and recommendations extracted from this project. With this we are not saying that this integrated framework is the last say in the development of a framework to investigate the lessons learnt. By no means will this framework capture everything we need to know about the lessons learnt. However, we believe that it is a step in the right direction and will start a debate that will assist policy makers and scientists in getting to a deeper understanding of CMA establishment. Based on this framework the analysis is envisaged to be more 'real' and thus, more relevant in order to create recommendations that cannot ensure but support successful catchment-based management and governance in South Africa.

CHAPTER 3: THE ESTABLISHMENT AND EVOLUTION OF RIVER BASIN ORGANISATION IN SOUTH AFRICA AND ABROAD

This Chapter reflects on the evolution of different processes and their respective organisations in order to implement and operate catchment-based management. Four cases have been reviewed and discussed, these being the two operating CMAs in South

Africa, two Proto-CMAs in South Africa, the Murray-Darling Basin Initiative and the Flussgebietsgemeinschaft Elbe in Germany.

Gaining insight into the establishment of the Breede-Overberg (BOCMA) and the Inkomati CMA (ICMA) as well as the operational history of the CMAs to date is the first section of this chapter and aimed at constructing a timeline of events. From this timeline, focus was on events occurring within the CMAs and external events relating to CMAs that have either had positive or negative impacts on the establishment and operation of these CMAs. From this, important lessons were established hoping to enable future CMAs to be more effective and efficient. One focus was on the influence and role of DWA head office and regional office with regard to CMA functioning, as there seems to be an element of tension between these two organisations. It was also envisaged to gain insight into how the establishment of CMAs affected water resource management in the regions (stakeholder's needs, environmental objectives, social and economic development) as well as the status of the resource itself. The main research question was: What is the history of the establishment, operation and evolution of the Breede-Overberg and Inkomati CMAs to date?

One of the main conclusions was that the establishment of both CMAs was both time-consuming, but at the same time highly inclusive and learning orientated. In order to promote stakeholder involvement large amounts of time was required during the initial stages. This can be attributed to the time needed to build trust – a common ground of knowledge of the operational area. This was the same with regards to the development of a Catchment Management Strategy (CMS). It seems that with processes of adding stakeholders or other conversational partners to the group of external actors to the CMA as well as reviewing strategic documents like the CMS, timeframes are reduced by now and human as well as financial capacity has increased. Further, changes within DWS did not affect the operation of the CMA directly but did have indirect and delayed effects. Formal decisions taken by the minister resulting in new bylaws, gazettes or NWA amendments that have some type of relevance to the CMA are highly problematic especially when not upfront communicated or discussed with the CMA. Such activities have the potential to make CMAs dysfunctional or at least frustrate and reduce moral amongst staff and stakeholders.

With an increase of operational area, the CMA has taken a long time to become actively involved in the new location. Another issue that was noted from the above timeline is that activities requiring government approval vary in terms of feedback, with come activities taking far longer than others. What was of major concern was the long periods between the initial establishment of the CMA, the appointment of a governing board and then the

appointment of staff. In the case of the BOCMA, this took over four years. This needs to be addressed in order to enhance the efficiency of the CMAs.

The second section of this chapter reflected on two cases of Proto-CMAs in South Africa. The conclusion from this investigation was that proto-CMAs may run very different types of establishment processes beyond the legally bound activities. Leadership and some type of goodwill seem to be relevant here. Also, both CMA cases were not operational as defined in this project. Thus, it needs to be assumed that proto-CMAs so far do not add to the decentralisation process of water management and governance in South Africa and, therefore, cannot initiate a transformative and more adaptive and tailored decision-making approach surrounding the country's water resources. It needs to be noted though, that there was not enough capacity within this project to further engage in this topic. It is therefore suggested to initiate more detailed and focused investigations into these processes unfolding across the country.

The third section looked at Catchment-Based Management in Australia as a possibly alternative approach to the South African way of water management. Australia has been engaging with catchment-based management for at least as long as South Africa and also started with a strongly decentralised approach. However, in the past few years this has been reverted and now water resources management is re-centralising. The main research question here was which are the main drivers of catchment-based management and then also what are potential lessons for the South African situation? The table below gives an overview of what the key themes established for this comparison and also highlights the main differences between these two countries.

Overview of the differences between the case studies with respect to the identified key themes:

Case Studies	Development Status	Social Acceptance	Cultural Conside-ration	Structure	Stakeholder Involvement
South Africa's Breede-Overberg Catchment Management Agency	Developing and currently undergoing post-apartheid changes	Community support, raising awareness	Correcting previous disparities of Apartheid	CMA is responsible for producing a CMS, aiming for decentralised management system	Present on a decision-making level
Australia's Murray-Darling Basin	Developed with far lower levels of inequality	Raising awareness, knowledge spread to public, experiencing community protests	Acknowledged cultural burial ground and have protected the area around Lake Victoria	MDBA responsible for basin plan implementation , moving towards centralised management system	Present on an information extraction base level

It can be concluded that the differences are mainly due to drivers within the respective countries and their legal policies and frameworks. In the South African case the challenges of overcoming the apartheid-related centralised governmental water structures and more or less unilateral decision-making culture while incorporating a decentralised approach is a dominating phenomenon that Australia does not exhibit with regard to any of the issues. In these case studies the economic or biophysical differences play a small role on whether a catchment-based management is successful. Due to the main issues for the Australian case in its re-centralisation phase being the lack of community support and limited stakeholder involvement and in the South African case being secured state funding and a pressure to implement in a shorter time frame, successful catchment-based management finally seems to be related to adequate political frameworks, commitment of communities and stakeholder involvement. It also seems that accepting longer time periods for change and securing funding for a variety of activities in the hands of the relevant CMA are needed for successful management and governance on a catchment scale.

The fourth and last section looked at the case of the Flussgebietsgemeinschaft Elbe. The aim was to draw some practical considerations from this for the South African situation. There are a number of issues that need to be considered by the policy makers and stakeholders involved in the establishment process. Structures of rule are important

constitutive aspects in the establishment of a river basin organisation. We have seen this in the case of South Africa's CMAs and the FGG Elbe. Nevertheless, structures of rule are not enough. There are other variables also at play in the establishment of river basin organisations and their subsequent governance. Variables that are important in this regard are the involvement of stakeholders during the pre-establishment phase and stakeholder relations after establishment. These are important aspects, which require careful management in order for the CMAs to achieve their objectives of decentralised, participatory, sustainable water resources management.

This German case further confirmed that the establishment of catchment-based organisation goes beyond the involvement of government entities or the stipulations contained in regulatory structures and policies. A number of actors or stakeholders from both the governmental and non-governmental spheres are involved. Practices go beyond regulatory mechanisms and often bring in personal experiences and the overall political landscape as well as administrative development trajectories. These are often also context-specific to the respective catchment. We additionally learned that we need to reflect on some of the administrative processes as a way to discern noticeable practices in the establishment of CMAs. Some of the practices that come out strongly are human resource issues and financial accounting practices that decision-makers need to consider as a primary area of concern when establishing CMAs; also, an appreciative relationship to key stakeholders, meeting them at eye level is key.

CHAPTER 4: PERCEPTIONS AND FEEDBACK FROM STAKEHOLDERS AND DECISION-MAKERS

Chapter 4 looked at three different topics in order to distil lessons based on the perceptions of different actors within the water sector in the establishment of CMAs.

The first section investigated inter-organisational knowledge management as the transformation of the water sector has resulted from a major paradigm shift in water management. If previously accepted views of water management have had to change, perhaps the associated information management had to change accordingly, or the range of the components of the environment, the data of which is required, is becoming wider. Also, there is a necessity to use data, which has reliable long-term records to simulate reasonably reliable forecasts, even if they were used by a central system. So, does that mean data and information used prior to the management change and paradigm shift respectively become of little value, relevance or out-dated? Thus, for this investigation hydrological information, models and participatory processes that are currently used in the two operational CMAs were investigated through a desktop study of government documentation and literature on the one hand, and complementally open-ended interviews with CMA officials on the other. As alluded to earlier it has become apparent

that the “new” structure of water management institutions in South Africa should be associated with a requirement for new types of data.

The results gained showed that most hydrological information used by CMAs is of a first order nature, i.e. rainfall, streamflow, water quality, hydrological water yield and reservoir storage levels. Much of this information is mainly monitored and made available by DWS national, with some information supplied by South African Weather Services and the South African Sugarcane Research Institute. DWS is the legal custodian of hydrological information used by CMAs. CMAs are starting to manage information for themselves, but hydrological models are supplied by DWS and are used only by IUCMA for water yield; the BGCMA is not using any models as yet, only through consultants. Furthermore, the general information flow observed is from the CMAs directed to the public. The public only informs decisions through the feedback of perceptions. Thus, public participation could be improved to not just awareness and education (knowledge sharing), but to engage into decision-making as well. This could initially be done as an experiment to see how effectively this approach will affect good management and an improvement of the water resources within the respective catchment.

The second section looked at intra-organisational initiatives and how these potentially impact water quality and water provisioning. The focus here was on corporate social responsibility initiatives (CSR) as an example. The background to this was that South Africa’s water supplies are quickly approaching their threshold as the demand for resources exceeds the resources available. All stakeholders need to get involved in mitigating the water crisis through a collaborative effort including firms to act as catalysts and improving the country’s water situation. Also, firms are often one of the largest and most influential water users in a catchment. Also, firms are one of the greatest perpetrators of water-related issues in South Africa and beyond. The involvement of firms in water quality and provisioning could have major positive impacts on water resources; CSR initiatives are an opportunity for this. Additionally, firms have the ability to create and encourage change due to their political influence and finances.

In reviewing the different CSR reports, it was noticed that a lot of the initiatives were not directly focussed on addressing water issues. This seems inadequate considering that South Africa is a water scarce country and water has been listed as a future constraint to development globally, not just in South Africa. It appears that there is not enough involvement of firms in water quality and provisioning through their CSR initiatives. Though the primary focus is still on social and welfare-related issues, they are not completely oblivious to water issues. Involvements currently are for example expecting suppliers to be using sustainable agriculture or exercising good environmental practises or using industrial water instead of potable water. Also, firms are getting more involved in

water quality and provisioning through the design of their future business plans. However, there is still much room for improvement and more focussed involvement. Another observation was that the CSR reports informed the understanding of firms mostly on national or regional level, catchment-based products/information were extremely limited. Also, firms reported well on the importance of looking after the environment and water, but not much information was released about their actual water figures. Issues such as wastewater volumes produced and level of contamination thereof, as well as water volumes released back to the environment, and water volumes reused or recycled, were absent.

It needs to be noted here that it is possible that some firms are not involved in water quality and provisioning due to them not knowing how to get involved, not because of indifference to the issue. In conclusion firms due to their economic and political influence and their reputation as one of the polluters and over exploiters of water could, if they got more involved, cover large grounds towards compensating their impacts and overall assisting the country in dealing with its water problems. The future does look promising, as many firms have committed themselves towards creating a more sustainable future. However, it is possible that government and policies may need to intervene more and create a more enabling environment for such activities, e.g. through campaigns, subsidies or similar

Under the third section an analysis of all meta-data was performed in order to further ascertain lessons learnt in the establishment of South Africa's catchment management agencies. The project team made use of expert interviews from 2010, a workshop specifically held end of 2015 with stakeholders and experts to discuss lessons learnt from their lived-experience, as well as a variety of other face-to-face interviews conducted in the course of this research project with relevant stakeholders involved in the establishment of CMAs in the past and presently. We also attended a number of stakeholder meetings organised by the two established CMAs: the Breede-Gouritz and the Inkomati-Usuthu Catchment Management Agencies (BGCMA and IUCMA). Furthermore, expert conversations and workshops held with and in proto-CMA areas were included in the analysis to broaden the knowledge and expertise we drew from for the lessons learnt.

The first step was to identify code words in order to gain insight into the extent interviewees and stakeholders covered certain themes. In other words, we wanted to see how many times the code words appear in the interviews and/or meetings as an important focus area. By doing the analysis in this way, we were able to see the lessons attached to the code word. Said differently, should a word, like decision-making, appear more often than any of the other code words, it will be an indication that advice and/or

recommendations around ‘decision-making’ is an important matter when considering the lessons learnt of establishing CMAs. In a next step we summarised the key messages of each interview or meeting, its relevance to the topic of CMA establishment and the lessons learnt so far. From the transcriptions, we started distilling key cross-cutting, content-related themes that emerged out of the research. This method is called the cross-sectional code and retrieve method enabling researchers to devise a common system of categories, which are then applied to the entire dataset to search for and find ‘chunks’ of labelled data. This is also a useful approach to make comparisons and connections across data. We identified the following cross-cutting themes:

- strengths and weakness,
- policy process,
- learning and improvement,
- historical development and past experience,
- processes and practices,
- pre-and post-establishment, and
- causal mechanisms.

CHAPTER 5: A QUALITATIVE DESCRIPTION OF PERCEIVED STRENGTHS AND WEAKNESSES IN REGARD TO CATCHMENT-BASED MANAGEMENT

Evaluating the performance of an organisation is a very challenging task. Varying context can also make certain aspects obsolete in some organisations. It is possible that certain issues will have very different weightings in different contexts. Thus, the decision was made to carry out a baseline study. This is done to provide an information platform or a measurement, in order to monitor, measure and assess the progress of an activity, or the progress made in implementing certain activities. Such activities could range from financial planning to service delivery within an institution; each of which could be measured. It also looks at the effectiveness of these activities and how such activities are implemented, changed or evolved over time. They help identify benchmarks or indicators when monitoring and assist in identifying targets. Baseline studies provide the necessary background, highlighting crucial information, hence allowing for effective future planning and operations. It needs to be noted, that case studies from around the world were reviewed, i.e. a multiple case study approach, so as to understand what activities or structures are successful in the real-world to achieve successful catchment-based water resources management in different contexts. Strengths and weaknesses from the case studies were identified and used as a baseline to illustrate what is perceived as a strength or a weakness regarding catchment-based management.

Some of the key messages from this section are:
- Financial aspects are key to the sound operation of CMAs. In the past financial resources were mostly adequate. However, with the vision of CMAs being finically independent from government and the extension of jurisdiction this is becoming highly problematic.
- In terms of adequate and competent staff, the CMAs currently face no issues. This was not so during the early days of the CMA. In order for the CMA to 'hit the ground running' staff from DWS that have roles that correspond to the CMA functions should ideally be transferred to the CMA. This however is a major stumbling block. Transfer of staff requires numerous processes and at times, the staff may not even be willing to relocate. Incentives should be in place to entice staff transfer to CMAs from DWS. The legal process involved in staff transfer should also be streamlined.
- With regards to co-learning, the CMAs have formed partnerships with local and international water resource management agencies. This is a positive aspect in that it allows for the transfer of skills between agencies. One issue with regards to co-learning is that CMA staffs are preoccupied with their own workloads. Within the institution, there seems to be a lack in the sharing of information between staff members.
- Another issue is that of support from the department. Upon establishment, the BOCMA received little support from DWS regional offices, whereas the IUCMA received no support. Support from the department is essential for resources management, especially in the cases on the CMAs. The CMAs are essentially taking over responsibilities from the department, hence it is important to have a streamlined transfer of functions, data and possibly staff.
- With regards to stakeholder aspects, the CMAs have been very successful in establishing excellent relationships with stakeholders. Numerous forums exist through which stakeholders can raise their concerns with each other and the CMA. The forums themselves initiate these meetings, and the CMA is invited to attend. On average, each forum has four meetings annually. However, a few shortcomings exist, one of them is the large area that the CMAs will be operating in and already show a low stakeholder turnout at meetings, due to travelling expenses.
- Based on the above, some future research recommendations can be made. Firstly, there is an urgent need to generate a set of quantifiable indicators that are able to assess the performance of a CMA. Such indicators should be given a value in order to determine whether it is a successful practice or not, as values are often the easiest to illustrate effectiveness and efficiency. Secondly, these indicators should be uniform, and have the ability to be applied to various CMAs across the globe. A third recommendation would be to conduct more analyses on CMAs and provide greater detail in these analyses with regard to their performances. They should incorporate all aspects of catchment management, not focus on certain aspects such as, decentralisation or the implementation of IWRM principles only.

CHAPTER 6: SOME CRITICAL REFLECTIONS ON WHAT HAS BEEN ESTABLISHED, BEFORE DRAWING FINAL CONCLUSIONS AND RECOMMENDATIONS

In the previous chapters and sections, a couple of key themes have been established, starting with the known literature and further emerging themes from the research over the past years. However, there is a potential bias from the literature and the often-repeated discourses between researchers and stakeholders in the South African context that may exaggerate some or even all of the recommendations to be established and that were published in Policy Briefs No. 1 and 2. If the recommendations are to minimise weaknesses and maximise strengths of the establishment and operations of CMAs or similar organisations, such bias must be revealed and rectified if need be.

The critical reflection showed that dominating themes, *viz.* majority of recommendations related to two (PBR 1: stakeholder participation and the relationship between the CMA and DWS) and three (PBR 2: finances, learning and once more stakeholder participations) themes respectively, are not reflecting a bias, but rather the necessities in those specific phases within a South African context, i.e. legal, relational and technical aspects. The recommendations include social, political and economic dimensions as their respective implication form a strong part of the overall water governance configuration within the respective catchments. Therefore, the dominating themes established are key towards improving governance effectiveness and to improve economic growth and sustainable development. Success is dependent on these themes but must also be related to the other themes and recommendations. Only by acknowledging all dimensions of the respective processes and players within these processes success can be ensured.

Overall it needs to be noted that politics, and with this relational aspect, play out strongly in both spaces and processes. The final conclusion reveals that every CMA establishment process will be unique, depending on people involved from a national, catchment and local level. Further, learning, adaptation and innovation will play a strong role in the operational phase as staff on a daily basis have to moderate a complex environment with often varying conditions and configurations with regard to biophysical, social, economic and political dimensions.

CHAPTER 7: THE ESTABLISHMENT, ORGANISATIONAL CULTURE AND RELATIONSHIPS IN THE ESTABLISHMENT OF SOUTH AFRICA'S CATCHMENT MANAGEMENT AGECIES

This chapter summarizes and concludes all the lessons we learnt from the experiences many decision-makers and stakeholders shared with us. Reflecting on them in the context we found them showing a clear message: establishment cannot be separated from operations, governance not from management, and internal pressures not from those from outside the organisation. Catchment-based institutions, when they cover a

reasonable territory, are incubators for the diverse issues of society, economy, planning and implementation. The following sections reflect the main lessons learnt from the establishment and the operations of the currently operating CMAs. Furthermore, a seminar design is proposed under the third section of this chapter. It is geared toward sensitising decision-makers and leadership of the CMAs (*viz.* Proto-CMAs) currently being established to the issues and lessons learnt that we have documented in this report. In the last and fourth section we suggest research that would help to 'dig deeper' into some of the issues in order to achieve further clarity on some of the relational issues we have come across.

The establishment of a CMA does not happen overnight. There are a number of issues that need to be considered by the policy makers and stakeholders involved in the establishment of a CMA. Our recommendations are:

- Be careful of 'panaceas' in how to establish a CMA in the quickest possible time – the establishment process does not happen overnight.
- The National Water Act (Act. No. 36 of 1998) is a structure of rule that gives direction in the establishment of catchment management agencies.
- Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgement. But keep all processes transparent and act trustworthy.
- Plan the establishment process carefully, especially when it comes to human and financial resources.
- Financial resources are a pivotal resource in the functioning of a catchment management agency.
- Labour unions are also a stakeholder in the establishment of a CMA and their involvement is crucial.
- The transfer of staff from regional and national DWS offices should be done in accordance with labour relations regulations, policies and practices.
- Secondment of staff from DWS to CMAs might be a viable option in streamlining human resources issues. However, it is important to note that functions and job profiles of a CMA are different to a regional DWS office. Flexibility and responsiveness are key here.
- Establish stakeholder relations on a good footing and sustain such relations.

With regard to the actual operations and day-to-day decision-making, CMAs will need to find innovative approaches and do things differently to the past. Our recommendations around organisational culture are:

- A safe and independent space of operation for the CMA is key.
- Time is needed to build trust within the organisation and to external players and stakeholders. Funding and autonomy of the employee are key here.

- Effective operations are only possible once all delegations have been assigned to the CMA.
- Be careful of ‘one size fits all’ solutions. The uniqueness of each catchment with regard to biophysical, social and economic characteristics calls for tailored approaches and solutions. These also depend on the personality, knowledge and capacity of the individual employee.
- Reinforced from Policy Brief 1: Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgement. But keep all processes transparent and act trustworthy.
- Reinforced from Policy Brief 1: Establish stakeholder relations on a good footing and sustain such relations.
- The assumption that operating CMAs lead to sustainable water management in short time periods and have the potential to reduce social unrests around water availability needs to be warned of. CMAs need time, funding and autonomy to learn what leads to success with regard to the biophysical-socio-economic interplay of the catchment.
- Any decisions taken by DWS have a direct impact on the operations of CMAs.

CHAPTER 8: FINAL CONCLUSIONS ON CATCHMENT-BASED WATER GOVERNANCE AND MANAGEMENT IN SOUTH AFRICA

The establishment of South Africa’s catchment management agencies may seem like a straight-forward endeavour because the process is seemingly elaborately outlined in the country’s National Water Act (No. 36 of 1998). There is, however, more to establishing these organisations than meets the eye. Policy makers involved in establishing these agencies need to take a number of ‘hidden’ elements into consideration that are not explicitly or even implicitly mentioned in the National Water Act. The relationship between employer (in this case the Department of Water and Sanitation) and its employees is one of the key aspects, but also relationships to stakeholders and other actors are of high relevance. In the establishment, but especially in the operational phase of CMAs, aspects of good management and those of water governance go hand in hand. They actually occur in hybrid forms on a daily basis and can make the establishment process as well as operations either smooth sailing or turn it into a nightmare. In this chapter we highlight this and some other issues, like financial management, as a way to communicate some of the lessons learnt in establishing South Africa’s catchment management agencies.

Investigating definitions of water governance and management from across the globe and reflecting them through our lessons learnt, we were able to clearly demonstrate that in catchment-based operations water governance AND management always occur in tandem. Governance is always there even if you do not have human interaction because governance is a neutral ideational causal mechanism. Management is just as important

as governance as its absence has severe consequences for development and monitoring and enforcement. Based on scientific theory only a balance of the two can lead to integrated and sustainable management. So, separating the two is not possible when operating a CMA. In addition, the establishment process has far reaching consequences for operations, be it with regard to stakeholder relationships, staff moral and learning 'spaces'.

One of the glaring gaps we identified during this part of the research is that research scientists are quite reluctant to investigate public administration process like public finance and human resource matters. For the officials we interviewed, public administration processes play a central role in the establishment of CMAs. One of our final recommendation is thus to advocate for research that investigates public administration processes in water resources management more closely.

ADDITIONAL PRODUCTS OF THIS PROJECT

Below the reader finds a list of several products that have been additional outcomes of this project and are (excluding the paper presented in chapter 8) separate products form the final project report. These are:

1 Paper:
Meissner, R. and Stuart-Hill, S.I. (in preparation). The Establishment of South Africa's Catchment Management Agencies: Where Governance and Management Meet. Water SA.

1 Book Chapter:
Meissner, R., Stuart-Hill, S.I. and Nakhooda, Z. 2017. The establishment of catchment management agencies in South Africa with reference to the *Flussgebietsgemeinschaft Elbe*: Some practical considerations. In Karar, E. (ed.), *Freshwater Governance for the 21st Century*. Heidelberg: Springer.

2 Policy Briefs:
Meissner, R., Stuart-Hill, S.I. and Nakhooda, Z. 2015. Practices for a CMA Establishment Process. Policy Brief 1. WRC Project 2320.

Stuart-Hill, S.I., Meissner, R. and Nakhooda, Z. 2016. Policy Brief on best practices of organisational culture and recommendations for successful relationships with stakeholders and other networks. Policy Brief 2. WRC Project 2320.

1 MSc Dissertation:

Nakhooda, Z. in preparation. The establishment, operation and evolution of catchment management agencies in South Africa: lessons learnt from the Breede-Overberg and Inkomati catchment management agencies. MSc (Hydrology) Dissertation, University of KwaZulu-Natal, Pietermaritzburg, RSA.

3 Honours Projects:

Crookes, C.C. 2015. Comparative Analysis of Catchment Based Management between South Africa and Australia. Hons (Hydrology) Project, University of KwaZulu-Natal, Pietermaritzburg, RSA.

Skosana, T.A. 2015. Hydrological Data, Models and Participatory Processes Based on which Decisions are Made Today by CMAs. Hons (Hydrology) Project, University of KwaZulu-Natal, Pietermaritzburg, RSA.

Ngcongo, A.M. 2015. The Involvement of Firms, through their Corporate Social Initiatives (CSR) and Operational Activity, towards Water Quality and Provisioning. Hons (Hydrology) Project, University of KwaZulu-Natal, Pietermaritzburg, RSA.

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- Ms E Buys
- Mr JG Reddy
- Ms P Jairam
- Ms E Bofilatos
- Ms CG Moyo
- Mr B Ashe
- Mr N Mkhize
- Mr J van Staden

Furthermore, the project team would like to thank all those stakeholders, colleagues and officials who have made time in their tight daily schedules to engage with us and share their knowledge and lessons learnt. It has been an amazing journey, thank you.

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CHAPTER 1: SETTING THE SCENE

Sabine Stuart-Hill[1] and Richard Meissner[1, 2]

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1.1 Background to the Report

Based on a solicited call from the South African Water Research Commission (WRC) in the first half of 2013, a research project entitled "Lessons learnt from the establishment Catchment Management Agencies in South Africa" was awarded to a consortium led by the Centre for Water Resources Research (CWRR) at the University of KwaZulu-Natal (UKZN), the Council for Scientific and Industrial Research's (CSIR) Water Governance Group and the Australian National University, Fenner School of Environment and Society.

The project falls within the WRC's Key Strategic Area 1, *viz*. "Water Resources Assessment", Thrust 1 "Water Resource Institutional Arrangements" and in Programme 1 "Water Governance and Institutional Reforms".

The Inception Workshop of this project was held at CWRR, UKZN in Pietermaritzburg on 19th August 2014. The following experts attended the Workshop and are hereby thanked by the Consortium for their valuable input and suggestions to the project:

- Ms E Karar
- Ms E Buys
- Mr JG Reddy
- Ms P Jairam
- Ms E Bofilatos
- Ms CG Moyo
- Mr B Ashe
- Mr N Mkhize
- Mr J van Staden

1.2 Project Motivation

Water plays a vital role in the well-being and economic activity of any society, be it within a rural or urban community, country or region. As a basic primary commodity, water contributes either directly (e.g. production of food) or indirectly (e.g. generation of electricity) to our livelihoods, lifestyles and wider economic activities. Thus, water in a water scarce country like South Africa is a catalyst to much societal and economic vulnerability and is furthermore, embedded in our historical and cultural storyline. Also, the country is lacking policy implementation in crucial areas, poverty alleviation is high on the socio-economic agenda and impacts of global change are severe. Additionally, the large number of impoverished people, a small middle class and a limited number of wealthy further result in strong inequalities (Swatuk, 2008). This is also true for levels of education, mobility and financial resources, and thus the population's vulnerabilities to risks are highly unequal. Therefore, water management in the sense of 'some for all forever' will need to incorporate much localised and diverse issues with those of national economics and development (Stuart-Hill *et al.*, in preparation). The resulting vulnerabilities should guide planning and decision-making. The information needed to address this is three-pronged:

- the impacts of change on the biophysical environment,
- the socio-economic characteristics of the sector, group or individual, and
- the manner in which changes over time on both aspects impact on the overall growth and development of individuals, groups, catchments and the region.

All three dimensions call for a wide range of data, knowledge and analyses, which have to be regularly updated. Incorporated into decision-making they should lead to specific management interventions that enable growth and development, empowerment and well-being of the people, society and the nation.

The above puts a strong emphasis on water governance as the canvas for water management and knowledge creation (Stuart-Hill *et al.*, in review). It furthermore, suggests that future water governance frameworks need to include 'future politics of synergized decision-making that adopt a broad and integrative approach to socio-economic development. It is within this domain that governments and governmental entities, such as catchment management agencies (CMAs), as legislated water resources management institutions start to play a pivotal role. CMAs have been designed to create that 'melting pot' of diverse knowledge and expertise drawing knowledge from stakeholders and practitioners. With the CMAs being rooted in the catchments they are serving issues of accountability and also trust building between government, industry, and civil society and the wider public respectively. This is why CMAs have been assigned a

pivotal role in South Africa's water governance system and especially its overall reform and transformation process.

However, apathy towards the implementation of CMAs has spread among non-governmental and governmental stakeholders. The source of this apathy is mainly due to delays in establishing CMAs (Sherwill *et al.*, 2007). Because of this apathy, there is a danger of a role-back resulting in old ways of management; a command and control approach is becoming a real possibility (MacKay *et al.*, 2003). The latter would be counter productive to a more integrative and vulnerability orientated approach of water management and governance.

1.3 Point of Departure

The current initiative to push for the establishment of the nine newly gazetted CMAs (2012 and 2016 respectively) in a short and very structured approach has given hope to many that still believe in the great potential that CMAs would have for sustainable growth and development in South Africa.

Therefore, this study will focus on CMAs and specifically the lessons learnt from the seemingly successful establishment of the two operating CMAs (i.e. the Breede-Overberg CMA [BOCMA] and Inkomati-Usuthu CMA [IUCMA]), as well as many other relevant processes linked to the establishment process that have occurred over the past 15 years (Meissner *et al.*, 2012) within the South African water landscape. As CMAs can be understood as central actors in a specific water governance set-up (here on the scale of a catchment), we may draw on lessons learnt from their establishment. But these need to be seen and understood in their specific environmental, societal and historical context. Although the National Water Act (No. 36 of 1998), provides a broad framework of intend, CMA implementation has evolved and changed according to broader societal learning and continuous improvement in the process accompanying implementation. These, including current functions, needed to be mapped as well. The documentation of the lessons learnt in the establishment process, change and current functions will form the basis of a repository for future practitioners, stakeholders and interested and affected parties that are participating in similar processes and will hopefully inform such processes to be more efficient and successful. Also, therefore, a differentiation will need to be made according to systemic, organisational and individual capacities (Ogallo, 2010). Additionally, such a repository can play a valuable part in closing the gap between policy making, policy implementation and local management practices at catchment level. It will also give the most vital insights into vertical and horizontal integration. These aspects are key components of a governance system since they determine the interaction different spheres of the policy process, from development to implementation, and local

management practices (Stuart-Hill *et al*., in review). These practices could then have a positive impact on shaping the transformation process of South Africa's water management (Methner *et al.*, 2012) and governance.

The project will therefore aim at identifying sustainable development pathways for the establishment of CMAs in the different biophysical, social, economic, political and historical contexts of the diverse and highly unequal society of South Africa. By using conversations, workshops and other participatory tools it will also allow the project team to create awareness and capacity for the different communities involved in CMA establishment. The repository as well as the guidelines envisaged will hopefully inform policy and lead to a better decision-making landscape in the water sector, going as far as societal empowerment, reducing vulnerabilities and fostering growth.

1.4 Purpose and Functions of CMAs – a brief overview

Catchment management provides an alternative to past water resource management initiatives, which were often focussed on command and control approaches, that hardly incorporated societal and environmental impacts and costs. Such management has in many ways become too costly over time. South Africa's National Water Act of 1998 (NWA) provides a foundation for a different, innovative way to manage the countries water resources (RSA, 1998). The NWA is trying to focus on the engagement of stakeholders (under DWS oversight), at all levels to determine issues at the source and provide tailored solutions, as opposed to treating only on an abstract level the effects of water on society and development (Bourblanc and Blanchon, 2013; Stuart-Hill and Schulze, 2010). The Act challenges past policies such as racial segregation (the apartheid regime) and development options (supply-demand) by portraying water resource management within the context of two important principles: equity and sustainability (Pollard and Du Toit, 2008). In order to incorporate these principles, an overhaul of past South African Water policies was required, moving water resource management towards integration, sustainability, equity, participation and the protection of the water resource.

The NWA is based on the concept of integrated water resources management (IWRM), which calls for the integration of all aspects regarding water management, including biophysical characteristics, societal issues, economic activities, cultural and organisational aspects just to name a few. All these aspects have to be recognized together, with the focus of managing water resources on a catchment scale therefore enabling participation of all communities, even those who have a minor stake (Bourblanc and Blanchon, 2013); this includes the historically disadvantaged. As such, 19 Catchment Management Agencies (CMAs) were envisaged (Meissner and Funke, in press; Bourblanc and Blanchon, 2013; DWAF, 2004). However, this number was later

downscaled to nine by the Minister of Water Affairs, Mrs Edna Molewa in March 2012 (DWA, 2012b). An entire chapter of the NWA was dedicated to CMAs and they were to form the “cornerstone” of the water sector reforming process (Bourblanc and Blanchon, 2013). These CMAs were to be the symbol of post-apartheid water management with a shift in management from a central government to a more decentralized approach aimed at giving local communities, more so previously disadvantaged communities a say in the management of water resources (Bourblanc and Blanchon, 2013; Schreiner and Van Koppen, 2002). Figure 1.1 below illustrates the position of CMAs with regard to water management in the country.

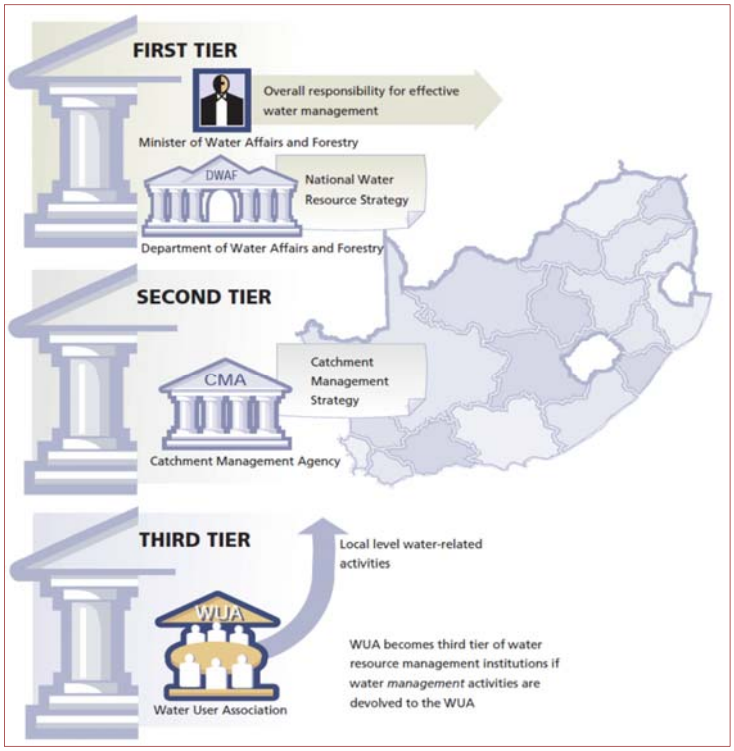

Figure 1.1: Overview of water resource management institutions (de la Harpe *et al*., undated)

According to de la Harpe *et al*. (undated), the most important factor in the establishment of a CMA is that of public participation. The interests of all stakeholders need to be adequately represented without discrimination. Every region has specific needs. Therefore, a CMA may be established on the initiatives taken by stakeholders and community members, or by the minister, if such initiatives are lacking (de la Harpe *et al.*, undated).

The Water Act states that ‘‘the Minister must promote the management of water resources at the catchment management level by assigning powers and duties to Catchment

Management Agencies'' (RSA, 1998: 38). The Act also notes that ''the purpose of establishing these agencies is to delegate water resource management to the regional or catchment level and to involve local communities'' (RSA, 1998: 39). As can be noted from the Water Act, CMAs are responsible for the management, planning and licensing of water resources within their designated region. CMAs are also tasked with the coordination of the water-related activities of other water management institutions and water users within the WMAs (de la Harpe *et al.*, undated). CMAs are governed by governing boards which represent all of the stakeholders affect by water use activities such as local municipalities, forestry, commercial agriculture and water user associations (WUAs) to name a few. The governing board is established by the Minister (Mazibuko and Pegram, 2006). A chief executive officer (CEO) is then appointed by the governing board to run daily activities within the CMA.

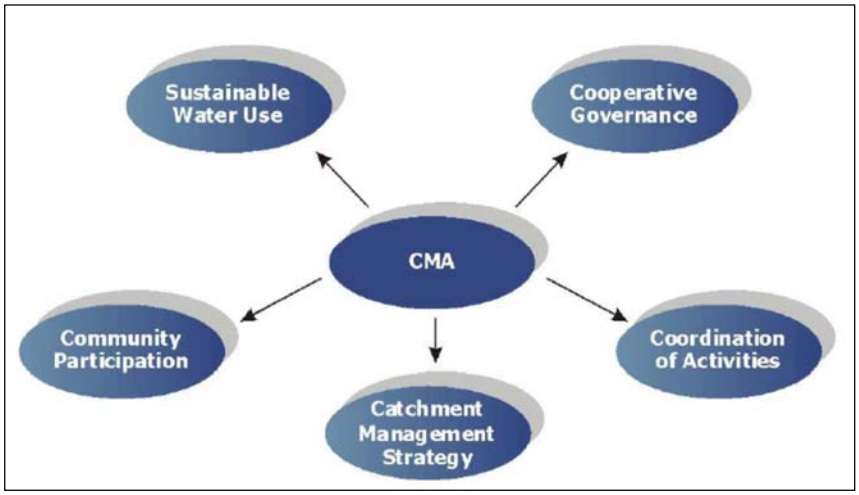

Figure 1.2: Role of a CMA (Mazibuko and Pegram, 2006)

Once a CMA has been established, there are certain initial functions that need to be carried out (RSA, 1998; de la Harpe *et al.*, undated).

- investigate and advise on the protection, use, development and control over water in the catchment,
- develop a catchment management strategy,
- coordinate related activities of water users and institutions, promote coordination of the implementation of the catchment management strategy with development plans resulting from the Water Services Act, and
- promote community participation

The intention behind the establishment of CMAs is summarised in Figure 2 and includes the promotion of sustainable development, water equity, redressing past racial and gender discrimination and facilitating/enhancing social and economic development

(DWA, 2012a). The NWA also requires the development of a national water resources strategy (NWRS), which provides a framework for water resources management in South Africa and also serves as a guide to developing a catchment management strategy (CMS).

The ultimate aim was to establish CMAs in all water management areas (WMAs). As alluded to earlier, catchment management initiatives form an important part of the NWA, but owing to implementation constraints within government, the effectiveness of catchment management is uncertain and the outcomes are difficult to analyse (Bourblanc and Blanchon, 2013). Not only that, to involve all stakeholders in the inception phase of the two established CMAs proved more difficult than previously anticipated (Meissner and Funke, In press). With the significant lack of implementation in regards to CMAs it must be assumed that some type of vacuum exists in South Africa's water related governance and management landscape. This research project aims to gain more insight into these different processes and drivers, in order to understand outcomes and from there enable water governance to influence more successful results and effects.

1.5 Challenges to CMA Establishment

The structure and capacity of institutions is an important part of water resources management, as it determines the effectiveness of policy implementation (DWAF, 2004). Such institutions are established by the minister, who is the public trustee of water resources within the country (DWAF, 2004). As mentioned earlier, the minister's initial intention was to establish 19 CMAs, one for each WMA. Over a decade after the inception of the NWA, the rescaling process of South Africa's water supply is faced with vast challenges (Bourblanc and Blanchon, 2013; Stuart-Hill and Schulze, 2010; Schreiner, 2013) resulting in policy changes. Through a press release in March 2012, the Minister stated that the number of CMAs were to be reduced from 19 to nine and stated numerous reasons such as: a lack of institutional capacity, a large number of institutions would pose difficulty for the Department of Water Affairs[2] to handle and cost issues (DWA, 2012b). A governmental gazette from 2016 (No. 1056) has formalised this restructuring and re-design of the WMAs and have been reduced to 9. This is crucial for water management and water governance, as the CMAs cannot operate beyond their set boarders.

Having read all the above the pressing question that comes to mind is: Why has the rescaling process of our water resources been so inefficient? It could be said that the implementation of policies has thus far failed (Bourblanc and Blanchon, 2013; Stuart-Hill

[2] Between 1994 and 2009 this department was known as the Department of Water Affairs and Forestry (DWAF) and between 2009 and May 2014 it was referred to as the Department of Water Affairs (DWA) (Meissner and Funke, in press). Currently it is the Department of Water and Sanitation (DWS)

and Schulze, 2010; Schreiner, 2013). There are numerous reasons for this, such as mismanagement, skills shortages and administrative issues, but according to Bourblanc and Blanchon (2013), there are two main reasons for the delays in the implementation of CMAs across South Africa's WMAs: Inter-basin transfers and power struggles between CMAs and the DWS (Bourblanc and Blanchon, 2013). In this context Bourblanc and Blanchon (2013) state that DWA does not want to retire its role as the responsible authority for water resources management, hence the CMAs cannot be too big, or contain too many of the so-called "big" stakeholders who would overpower government decisions. As a result, in the case of the Western Cape, BOCMA did not combine with the municipality of the city of Cape Town, even though it was viable to do so (Bourblanc and Blanchon, 2013).

Catchments are viewed as the natural unit to manage water resources, but depending on the situation, they may not be the best suited (Bourblanc and Blanchon, 2013). Catchments overlap political boundaries therefore the uses for water resources may differ and even cause conflict between different users (Bourblanc and Blanchon, 2013). According to Warner *et al.* (2008), water resource issues are not confined to catchments, but are rather found to cross national or even international boundaries. With regards to CMAs, where focus is on the decentralized, local management of water, inter-basin transfers pose a challenge. South Africa has a long history of inter-basin transfers, largely due to the growth of industrial centres large distances away from water resources. As such inter-basin transfers had to implemented to move water from where it was available to where it was needed (Turton and Meissner, 2002; Meissner and Turton, 2003; Turton *et al*., 2004). If CMAs are to manage specific regions only, there is bound to be conflicts between CMAs of different regions. This was highlighted and the proposed new 9 CMAs attempt to address this by combining water management regions (Bourblanc and Blanchon, 2013). However, there still remains the question of political influence in determining WMAs. These modifications and pre-determined boundaries, have to an extent, seemingly hindered the management of water resources at a catchment level (Bourblanc and Blanchon, 2013).

Overall, it needs to be concluded that even though the policies in place are well developed, numerous challenges arise in the implementation of those policies (Meissner *et al.*, 2013; Stuart-Hill and Schulze, 2010). In addition to the aforementioned reasons for the delay in implementation, challenges also arise within CMAs. Stakeholder participation is one such challenge (Meissner *et al.*, 2013). The challenges that multi-stakeholder institutions face is related to issues of power, where larger groups are given a greater voice as opposed to smaller sectors (Meissner *et al.*, 2013). Not all of the present stakeholders have the capacity to contribute meaningfully to decision-making, often due to language barriers or a lack of knowledge. In some instances, stakeholders feel over-

powered by others hence, their opinions are not considered, resulting in lack of attendance in public meetings as there no longer exists any incentives (Meissner *et al.*, 2013). As a direct result of this, the necessary integration of sectors does not take place (Stuart-Hill and Schulze, 2010).

It further needs to be realised that a CMA does not comprise of the CMA governing board or CMA staff only but is rather an enabling space for the engagement of all stakeholder sectors as illustrated in Figure 1.3 below (Dent, 2012). Sectors will inevitably contest the quantity of water allocated to them, hence the role of DWA to act as a mediator or referee. Transparency is important, but not the only necessary condition, to resolving conflict relating to water resource management. If different sectors hide their dealings, it could create an environment where trust amongst stakeholders is deteriorated. This could hinder the process of engagement, often resulting in lack of interest and finally creating greater complexity in the management of water resources. It is important to note that trust, just like transparency, is not the only necessary condition to ensure the proper management of water resources within the ambit of potential conflictual relations. The danger in focusing on only one emotion, like trust, is that researchers will focus exclusively on trust and how to build trust. Other equally important variables may not be incorporated in a project where lessons need to be documented on the establishment of CMAs.

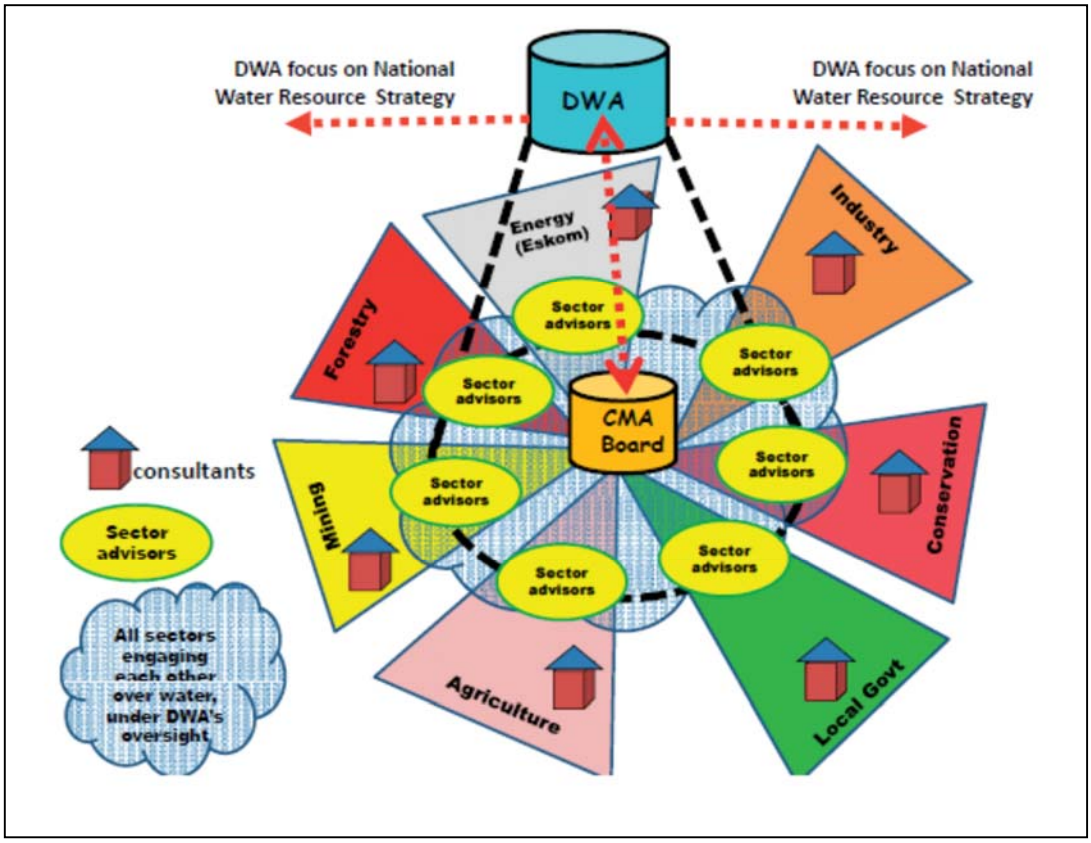

Figure 1.3: An illustration depicting DWS standing in oversight over multi-stakeholder engagement in the CMA conceptual space (Dent, 2012)

Therefore, this research project will go beyond a one-dimensional view on the process of CMA establishment and operation, but will try to include organisational, institutional [3] and societal aspects.

1.6 Identified Research Questions, Impacts and Aims

It needs to be noted that the NWA is an excellent piece of legislation and has become a symbol for change. However, as alluded to above implementation of the Act has proven to be difficult, both for government and its institutions. Chapter 7 of the Act is dedicated to the establishment of CMAs, which is aimed at addressing water resource issues at a local, as well as catchment scale. They reflect a strong part of the decentralisation of water management, through which also the inequalities of the past are to be addressed.

[3] Organisations are here understood as formal organisations that operate with a mandate, budget and staff. Institutions on the other had include the respective organisations' missions, mandates, cultures, norms and rules, as well as structures, competencies, and human and financial resources

Yet, owing to the poor implementation, the re-allocation process has not occurred as expected. As alluded to, since the inception of the Act 18 years ago, progress with regard to the establishment and operation of CMAs has been very slow.

Of the 19 proposed CMAs, only two have been established and are currently operating. There are many reasons for this such as, lack of capacity, aiming to change to fast, issues of authority and cost, to name a few. Government has realised the importance of establishing CMAs based on reports provided by the 2 existing CMAs and their efficiency in water management. Moving forward, the minister has reduced the number of proposed CMAs from 19 to 9, with the aim of establishing them within the next few years. A review of the literature and as discussed in the previous sections, we have shown that although South Africa's water policies are brilliant in incorporating the IWRM approach, actual implementation is a cause of concern. It is therefore essential to critically observe the two established CMAs, their management structure, composition of the stakeholder committees and governing boards, day to day running, so as to determine what lessons can be taken from these two CMAs. Also, weaknesses and failures need to be identified in order to learn from them when moving forward.

Based on the discussed above the following issues present themselves for detailed enquiry and have been formulated as guiding research questions for this project:

- HOW can the historical developments around the establishment of CMAs with a map or timeline reflecting key processes and events be described? This needs to include the contextualisation of what has happened into the evolving societal, policy as well as political canvas of that time. An emphasis will be given to the enabling or disenabling environment for CMA establishment.
- What have different stakeholders VALUED in the past and value currently regarding the successes and strengths of the two operating CMA processes?
- WHY has success, in regard to the not only gazetted but operational CMAs, established itself in certain areas and not in others? Is this linked to local or regional circumstances, or organisational or individual dimensions of the actors involved?
- Can REFLECTION on weaknesses of the overall processes of CMA development (including the acting proto-CMAs) inform us further about good practices for such a demanding organisational change?
- What could others LEARN from the experiences and evolution of CMA processes in order to improve their process implementation and practice? How can we maximise the strengths and minimise the weaknesses of these transformation processes?

1.6.1 Expected Impacts

The impacts of the research to emanate from this project are geared mainly towards understanding the successful operation of CMAs in South Africa. Thus, the impacts should have positive bearings on society, the economy, health and the environment. The expected research outcomes will propose some answers towards these regarding:

- Identifying key endogenous and exogenous challenges that have hampered the CMA establishment processes – Understanding the different positive and negative impacts of the past establishment processes of the currently operating CMAs.
- Identifying key actors and processes that have played a facilitative role in the establishment of different CMAs processes.
- Establishing the causal links between the elements of the establishment process (e.g. actors and processes) and the successes and failures of the establishment process (performance and learning outcomes). By this identifying the lessons learnt.
- Assessment of tools and boundary objectives that have helped CMAs to create collaborative relationships with stakeholders and decision-makers
- Develop guidelines how decision-makers may maximise the strengths and minimise the weaknesses within their specific establishment process.

As a result, the proposed research should create a repository of the processes pre- and post-establishment of the two CMAs under investigation and distil lessons learnt from the establishment as well as maturing process of CMAs. This will hopefully assist the current processes of CMA establishment to identify successful trajectories of development and operation.

1.6.2 Aims of the Project

The research associated with the aims of this project is linked to the identified research questions as listed above under 1.6. In our proposal these aims are articulated as follows:

1. Tell the story of the establishment and evolution of BOCMA and IUCMA up to date.
2. To identify the processes that either had positive or negative impacts on CMA establishment.
3. Determine how stakeholders perceive the success and strength in the CMA establishment process.
4. To examine causal links between elements of the establishment process and its successes and failures.
5. To determine who acts and what the consequences are.
6. Identify new opportunities and challenges regarding future CMA establishment.

The two main products, which correspond to these aims, were envisaged as:

A. Repository of establishment and evolution of two operating CMAs
B. Guidelines for an enabling environment and successful establishment as well as operation of CMAs for the current policy process[4]

In the course of the project a variety of other products have emerged, such as two policy briefs, a book chapter, a paper, two Honours projects and one MSc dissertation. Furthermore, has this research project and its outcomes been influencing and updating 3rd year and Honours lecturing at UKZN.

1.7 Methodology

During the Inception Workshop the Reference Group confirmed the methodological approach chosen by the project team. However, suggestions were made that have now been included in the methodology and are marked in *italics*.

We argue that in polycentric governance systems, which are characterised of various autonomous decision-making units operating at various levels (Ostrom, 2010), effective vertical and horizontal integration resulting in coordination and collective action can rarely be achieved through hierarchical top down approaches. However, they are crucial to achieve integrated and adaptive management with sustainable outcomes. In South African, CMAs were supposed to play that pivotal role of creating polycentricism as well as offering space for integration and adaptive management. Therefore, CMAs are critical in the transition from a narrowly defined, technological focused and centralized governance approach (command and control) to an adaptive and integrative polycentric governance system. Rather than adding an additional institutional layer to the existing governance landscape their role is to function as a so-called boundary or bridging organization. By taking on a facilitative and coordinating function in the system they are supposed to create important cross boundary linkages in the governance system that allow for dealing constructively with trade-offs (e.g. differences in interests and needs) and for ensuring that arising problems are addressed at the appropriate sale(s) and level(s). CMAs are particular important for:

- Combining different knowledge sources and dissemination the co-created knowledge on the resource system to all relevant actors within and beyond the catchment.

[4] Based on the discussions from the Inception Workshop the Project Team was encouraged to consider a more innovative approach than a set of guidelines. Also the team was requested not to duplicate what is already in existence.

- Empowering stakeholders by ensuring that everyone needs and interests (including those of the most vulnerable groups and the environment) are taken into consideration.
- Assisting other government agencies to become good water resource managers and stewards (e.g. municipalities) and to help to balance trade-offs between different sectors.
- Facilitating the self-organization at sub catchment level as well as catchment wide collective action through which key management functions can be carried out (e.g. joint monitoring programs).

To summarize, besides taking on critical water resource management functions at catchment scale the work of CMAs revolves around relationship building (creating collaborative relationships to and among the different stakeholders including government agencies) and providing for the required iterative learning platforms through which those relations can be developed.

However, it is not easy to fulfil such a role because CMAs need from the beginning to engage in several processes simultaneously: creating a functional organization, caring out critical WRM management functions at catchment scale, establishing relationships with local stakeholders and higher-level decision-makers as well as creating collaborative relationships among stakeholders. All of these processes are interdependent. Hence, weaknesses or obstacles in one process will impact the quality of the other processes. We therefore, will take a holistic approach in analysing the evolution of the CMAs by highlighting what challenges (exogenous and endogenous) and opportunities (e.g. building on existing collective action initiative, being supported by other bridging organizations, allowing champions and leaders to emerge, etc.) arose in each process but also how the processes influence each other. For this a specific framework has been developed (*cf.* Section 1.7.1 and Chapter 2) that enabled the project team for a more rounded and holistic view of the realities of CMA establishment and operations.

Furthermore, in order to gain insight into the historical dimension of establishment as well as evolvement over time of the different CMA processes, an analysis was performed leading to a timeline for both operating CMAs. This was achieved by exploring the interplay between policy making, implementation and local water resources management (*cf.* Chapter 3). Including the perceptions and experiences of key water management groups will complement the findings, and we were able to understand the framing and enactment of roles and responsibilities in South Africa's water resources management (*cf.* Chapter 4). Furthermore, relations between actors – connected horizontal or vertical – characterize the interplay in more detail and resultantly provide insight into the influence

of specific actors on the successes and also weaknesses of past experiences (*cf.* Chapter 5).

It is important to build on the relationship already established with those stakeholders that were initially involved in the establishment of CMAs and the implementation of the NWA. These stakeholders include, for instance, former and current officials from the Department of Water and Sanitation and consulting companies that were responsible for the establishment of the two operating CMAs. These stakeholders have valuable insight into the history of the establishment process and their knowledge of the process should be captured in as much detail as possible. Here, questionnaires and interviews have played an important role. The institutional memory of the IUCMA and BOCMA, is crucial to be tapped for applicable knowledge. The decision-makers within these CMAs also have valuable insight into the establishment of the respective organisations. Personal or face-to-face interviews have been employed to gather the necessary information. We have also considered a comparison of the overall implementation levels of South African water policy in regards to catchment-based management. This was evaluated in the first year. It was seen as useful by the project team to compare catchments and provinces with operating CMAs with those of other catchments/provinces that have only a proto-CMA within the Regional DWS Offices in place. *Here also cases of established but not operational CMAs may be helpful and thus, have been incorporated into the investigation.*

The following three sections (*cf.* 1.7.1-1.7.4) constitute key activities from which the project team has extracted information and gained insight into CMA establishment and operations in South Africa. These form the foundation for our conclusions and recommendations in Chapter 7. Finally, the two leading researchers on this project, i.e. Dr SI Stuart-Hill and Dr R Meissner, have captured their new insights into the interplay of water management and governance in a paper presented under Chapter 8.

1.7.1 Designing a framework for analysing the establishment and maturing of the existing CMAs

A framework assisting in capturing the lessons learnt during the CMAs' establishment needs to take diverse institutional, epistemic, paradigmatic and theoretical as well as actor dynamics into consideration.

Because we are confronted with a wide variety of actors or agents from an assortment of institutional (e.g. DWS), material (e.g. emerging and commercial farmers from the agricultural sector) and ideational (e.g. scientific community and consultants) structures,

an analytic eclectic[5] approach could be the most optimal way of capturing the knowledge about the lessons learnt from the establishment of CMAs in South Africa. Sil and Katzenstein (2010a: 21) have the following to say about analytic eclecticism and its treatment of epistemic divides.

> "For the substantive questions on which analytic eclecticism is intended to shed light, assumptions concerning the ontological primacy of agency/structure or of material/ideational domains of social reality cannot be converted into a priori causal primacy of either agents or structures, and of either material of ideational factors. Eclectic research considers the different ways in which individual and collective actors […] form and pursue their material and ideal preferences within given environments. It also draws attention to the manner in which external environments influence actors' understandings of the interests, capabilities, opportunities, and constraints."

What this passage means is, that if we would like to shed light on the question of the lessons learnt in CMA establishment, we should get rid of a priori assumptions about the nature of reality. 'Reality' comprised of agency, structure, material and ideational domains and the debate about which of these domains are more important in constituting reality. The focus of eclecticism is also not only on collective actors, like government departments and water user associations, but also on individual actors such as an emerging farmer or scientist. Analytic eclecticism determines the different ways how these actors chase their preferences (e.g. a more important interest in or desire for somebody than somebody else) and the role of external environments (e.g. water scarcity or competition over water) in constructing actors' norms and identities. What is, however, the key aspect of analytic eclecticism, in relation to the development of the framework for analysis, is its focus on a middle ground between the agency/structure divide and the material/ideational divide. In other words, in any environment under consideration, such as a water management area over which a CMA has control, debates about the primacy of agency as opposed to structures are irrelevant because both play an important role in constituting relationships among actors. What is important to note is that all four domains are important in constituting reality. Not only that, a priori knowledge, or the knowledge that rest on rational intuitions or knowledge that is independent of experience (Russell, 2014), is undermined by analytic eclecticism. In other words, analytic eclecticism calls for the development of new knowledge that is not based on theoretical generalisations.

This means that a single theoretical framework, like, e.g. adaptive management, with its focus on social learning (Lee, 1999) would not suffice in the development of the

[5] Analytic eclecticism is not an alternative model to research such as the qualitative or quantitative methods. It is rather an intellectual stance that researchers can adopt when doing research that does not fit established research traditions in the form of paradigms and theories in a particular discipline or field (Sil and Katzenstein, 2010b).

framework. An a priori claim by adherents of adaptive management notes that: “Efficient, effective social learning, of the kind facilitated by adaptive management, is likely to be of strategic importance in governing ecosystems as humanity searches for a sustainable economy” (Lee, 1999: 3). This is not to say that such a claim is wrong, anything but! Yet, by looking for ‘efficient and effective social learning’ in the ambit of the lessons learnt in establishing CMAs, could detract the research team from elements that are situated outside this ideational structure-type of action. In other words, by focusing on one theoretical framework – they all have their strengths and weaknesses – only will limit our ability to discover our ability to see how agency, structures and material elements play an interdependent role in the establishment of CMAs.

As alluded to above, not one theory can explain everything happening in the world (Aron, 1967; Albert and Buzan, 2013). Theories are creations of the human mind and so too are paradigms or the views we hold of the world. Said differently, how we generate knowledge will have a bearing on the way in which we analyse reality and come up with remedies to solve problems and create opportunities (Meissner, 2013). Cognition with the rationalist scientific method is also possible, meaning there is not only one dependable way of knowing (Eisner, 1990).

Having said that, we will develop a framework for analysis to identify and analyse the lessons learnt in the establishment of CMAs in South Africa. This framework needs to take into consideration the agency, structures, material and ideational divides that explain reality. The framework should also not be overtly rationalist or post-positivist and needs to cut across the entire paradigmatic spectrum incorporating rationalism, post-positivism, interpretivism/constructivism, critical theories and the participatory paradigm. *Attention will also be given to the politics influencing events and decisions.*

1.7.2 Building timelines of CMA establishment and operations

A first step will be an extensive review of both, the BOCMA and IUCMA, in order to develop a timeline of influential events regarding the establishment and further development of the two mentioned CMAs. Such events will include, but are not limited to:

- Internal organisational matters, e.g. governing board meetings, operational changes including HR processes and budgeting, published progress reports, newsletters, etc.
- External organisational matters, e.g. delegated tasks by DWA, voluntary tasks, community involvement, political events, etc.
- International Relations
- Influential consultancies and stakeholder engagements
- Biophysical issues, e.g. general stresses, natural hazards
- Economics influencing establishment and operation of the organisation

Once this has been done, aspects of significance will be highlighted and looked into so as to ascertain a better understanding of each event. This will be focused on actors involved, their relations to each other, effects of the event on knowledge creation, decision-making, and ripple effects within the organisation and its people, as well as beyond. Additionally, perceptions will be scanned through an interviewing process in order to establishing what the normative common understanding of CMAs were and are.

1.7.3 South African Catchment Management Agencies as places of learning

The concept ‘lesson’ has a number of meanings in the English language. The first meaning is that it can refer to ‘a period of time in which somebody is taught something.’ The second meaning refers to ‘something that is intended to be learned’, while the third meaning relates to ‘an experience, especially an unpleasant one, that somebody can learn from so that it does not happen again in future.’ Then there is a fourth and a somewhat clerical meaning where a lesson is ‘a passage from the Bible that is read to people during a church service.’ The word ‘lesson’ is from the Latin word *lectio* meaning choosing or reading. The word learn also has a number of meanings in the English language. Learning means ‘to gain knowledge or skill by studying, from experience, from being taught, etc.’

The concept ‘discovery’ is a synonym for learning where learning is ‘to become aware of something by hearing about it from somebody else’. The word has its origin from the German word *lernen* (OALD, 2013). What both the concepts ‘lesson’ and ‘learn’ have in common is that some sort of new knowledge is acquired by somebody through the action of learning, becoming aware of something or hearing something from other people. This means that both ‘lessons’ and ‘learning’ have an action component and that actors of various sorts are involved. This action and actor component attached to both ‘lessons’ and ‘learning’ are both important elements to take into consideration when developing a framework for analysis. It is also important to note that there are different knowledge types attached to these actors. Knowledge or the gaining thereof in whatever form, is after-all, the end result of both ‘lessons’ and ‘learning’.

1.7.4 Other pathways of enquiry in order to gain insight into knowledge creation and decision-making in the realm of catchment-based management

The development of a knowledge and information management framework is considered very important in the management of natural resources (Wangusi, 2012) such as water. Information and knowledge of a catchment or WMA, such as

- hydrological water yield,

- climate,
- ecology and
- stakeholder perceptions

is needed by decision-makers in the management of water resources and can be acquired from source such as

- databases and libraries,
- expert consultation,
- stakeholder interviews, and
- computer models (Hughes, 2002; Schulze *et al*., 2004; Wangusi, 2012).

Thus, another focus of this research project will be on the decision-making environment that utilises a variety data and information, how it is accessed, who works with it, etc. Not only is information needed in traditional water management, but decision support systems are a necessary component of adaptive management of natural resources as well (Wangusi, 2012). Knowledge and an understanding of certain attributes of a catchment or a WMA can aid in decision-making. Decision support systems are considered a critical aspect of resources management. Much information is required or is advantageous in allowing decisions that have to do with allocation of water for socio-economic use, while still maintaining the health and integrity of the ecological physical environment, from which people attain ecosystem goods and services such as food, fodder, fibre and fresh air (Wangusi, 2012). These goods and services are needed by people and depend on the availability of water to the environments, thus information allowing management that considers this need is necessary.

However, information about more than just the natural environment component of a catchment or WMA is required in sustainable management of water resources. The human aspect has become very important in hydrology and more especially to decision-makers, more in the current day than ever before (Wagener *et al*., 2010; Montanari *et al*., 2013). This inclusion increases the complexities in the system, which is complex enough, naturally (Rossow *et al*., 2005). These complexities are aggravated by the fact that the social environment is constantly changing, as well as the natural environment and political scene (Wangusi, 2012). Although there are changes, natural and anthropogenic, the ability of the system to remain productive in terms of water resources and all the resources needed from it must be maintained (Wangusi, 2012). Information keeping up with these changes is required to allow adaptive management (Rossow *et al*., 2005).

Not all information provided by research is used. Wangusi (2012) focussed on information which does get used by water management, thus identifying the gap between research-available information and information that actually does get used. It has become apparent that the “new” structure of water management institutions is associated with a requirement

for new types of data. The state is placed in the centre of data and information acquisition, monitoring, management and distribution; communicating information and data amongst different organisations independent from DWEA (Harris *et al*., 2001).

In sustainable management, modelling can play its role as a tool to aid decision-makers. Wangusi (2012) referred to modelling as part of the management process which is iterative and consultative, allowing informative consultation to decision-makers (Hughes, 2002). Models can be used to assess possible allocation scenarios, whether or not the catchment water yield is enough for certain activities, whether or not certain resources may be utilised or left to the environment for the purpose of sustaining ecosystems (Wangusi, 2012). Raw data about catchment characteristics can be modelled in order to predict certain hydrological responses to certain catchment attributes, such as soils, vegetation, topography and geology (Hughes, 2002). Different types of models are used and information can flow from one model to the other, the output of one model can be the input of another, using data from rain gauges and remote sensing (Hughes, 2002). The effective use of hydrological models requires much expertise, although South Africa has limited skill for a larger population which needs the information supplied from modelling and the need is expected to increase (Hughes, 2002).

Furthermore, any decisions taken will be based mainly in cultural and political contexts, which are reflected by domestic and international norms, (as they “channel and regularise behaviour”) (Finnemore and Sikkink, 1998: 894), values and world views (paradigms). These not only change over time but vary between societal groups and decision-makers (O’Brien, 2009), as well as other institutional and organisational factors, such as routines and views (Inderberg and Eikeland, 2009). Thus, although context and culture may limit or constrain action (Finnemore and Sikkink, 1998) they definitely also shape the options chosen and the interventions designed during policy interventions.

Additionally, institutional constraints may hamper or limit access and processing of data and influence the learning and decision-making environment. This applies not only within a single organisation, but in entire systems (Inderberg and Eikeland, 2009), in this case the water sector. This is where learning as well as every-day routine-based activities play a crucial role (Roux *et al.*, 2008; Inderberg and Eikeland, 2009) and will have to be part of the planned investigation.

Thus, an inquiry will be done through a survey on the issues discussed above; mainly what data, information and models are used, who accesses and influences the usage, what role do participatory processes play in the acquiring of information and the creation of knowledge.

With the intention of identifying lessons learnt, such events need to be categorised into actions that have 'strengthened' and others that have 'weakened' the establishment and maturing process of the relevant CMAs. For this a benchmarking exercise needs to be undertaken looking at local and international cases of catchment management and multi-stakeholder governance. *Specific attention will be given to African cases. Furthermore, communication structures between organisations and stakeholders will be investigated.* By reviewing such cases criteria will be established, against which key events will be measured and rated with regard to their effectiveness/usefulness.

Through this benchmarking exercise it is envisaged to highlight some of the implementation and operational challenges South Africa is facing with regard to the decentralized approach to the management of the country's water resources. Additionally, the rating could help in identifying opportunities for structured engagement of employees, stakeholders and others, resulting in suggestions for the current establishment processes of CMAs. These would hopefully result in more successful and sustainable organisations in the future.

1.8 Conclusion

This section of the report should be seen as a document providing the point of departure and the cornerstone of the multiple, yet interlinked facets of the research that was undertaken by the Consortium within the contract period. It should, furthermore, be viewed as a document out of which certain elements were expanded upon, while other elements were debated and even amended as and when experiences and results were coming in. Such experiences and results showed the Consortium and the Reference Group what was more viable to achieve, or less so – all within the spirit of the contract.

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CHAPTER 2: A FRAMEWORK TO ACCOUNT FOR THE CAUSAL RELATIONSHIPS BETWEEN THE ELEMENTS OF SOUTH AFRICA'S CATCHMENT MANAGEMENT AGENCY PROCESS AND ITS FAILURES AND SUCCESSES

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2.1 Introduction

The purpose of this framework for analysis is to outline the analytical process that the research team has followed when investigating the lessons learnt from the establishment of South Africa's catchment management agencies (CMAs). Since we were investigating the lessons learnt from the CMA establishment process, it would be pertinent to kick off this framework for analysis with an explanation of the concepts 'lesson' and 'learning'. The concept 'lesson' has a number of meanings in the English language. The first meaning is that it can refer to 'a period of time in which somebody is taught something.' The second meaning refers to 'something that is intended to be learned', while the third meaning relates to 'an experience, especially an unpleasant one, that somebody can learn from so that it does not happen again in future.' Then there is a fourth and a somewhat clerical meaning where a lesson is 'a passage from the Bible that is read to people during a church service.' The word 'lesson' is from the Latin word *lectio* meaning choosing or reading. The word learn also has a number of meanings in the English language. Learning means 'to gain knowledge or skill by studying, from experience, from being taught, etc.'. The concept 'discovery' is a synonym for learning where learning is 'to become aware of something by hearing about it from somebody else'. The word has its origin from the German word *lernen* (OALD, 2013). What both the concepts 'lesson' and 'learn' have in common is that somebody through the action of learning acquires some sort of new knowledge, becoming aware of something or hearing something from other people. This means that both 'lessons' and 'learning' have an action component and that actors of various sorts are involved. This action and actor component attached to both 'lessons' and 'learning' are both important elements to take into consideration when developing a framework for analysis. It is also important to note that there are different

knowledge types attached to these actors. Knowledge, or the gaining thereof in whatever form, is after-all, the end result of both ‘lessons’ and ‘learning’.

Following this and acknowledging that actions and actors are part and parcel of the learning process, we will proceed with the framework for analysis in the following way. In the first section we outline the CMA process to date. The purpose of this section is to indicate to what extent CMAs can be or are places of learning. We will then continue in the second part of the framework, with an elaboration of the concept ‘cause’ or ‘causation’. We deem it important to say a few words on the concept ‘cause’ or ‘causation’ because it is one of the central elements of the framework. In the third section, we design the framework for analysis. The framework is the integration of a number of frameworks already in existence in the water governance and water politics discourse. These frameworks are that of adaptive management and pragmatism utilised and developed by Stuart-Hill (2015), Pahl-Wostl *et al.*’s (2010) management and transition framework and Meissner’s (2014) framework for analysing water politics in river basins or catchments. We end the framework for analysis with a conclusion.

2.2 South African Catchment Management Agencies as places of learning

A CMA is a type of river basin organisation (RBO) that is supposed to perform certain water resource management functions with which it is being tasked by law. The management of the water resources of a CMA is also supposed to take place in a climate of cooperation amongst various stakeholders. The central idea behind the establishment of CMAs in South Africa is to decentralise water resource management to the water management area level based on the subsidiarity principle (Funke *et al*., 2007). In so doing the aim is to create an institution that is closer to the water users in the said water management area than what a national entity, like the Department of Water and Sanitation (DWAS) and its regional offices would be. Basically, the CMA is the ‘space’ where guidance is given through national water policies, but specific catchment characteristics (e.g. the environmental set-up, historical levels of development) and stakeholder needs (societal and economic) are considered in aiming at catchment-tailored development plans such as the legally binding catchment management strategy (CMS). The latter (i.e. the CMS) theoretically leaves enough flexibility to tailor activities even at the sub-catchment scale. This would ensure that the needs and views of the different participants are understood and, in the end, sum up to a holistic strategy. During interviewees with experts from the water sector in the years 2009 and 2010 CMAs were – not surprisingly – often mentioned as being the example of a learning platform and as a place for significant cooperation. However, at the same time the interviewees identified the CMA as a space where strong political influences are possible. In this regard, these influences will also have to be taken into consideration and especially how they contribute

or detract from the learning experience in the CMA. It is after all, and as mentioned above, the relationships between actors that constitute learning.

During the establishment of BOCMA, as an example, a variety of stakeholders were either directly or indirectly involved in the process (Meissner and Funke, 2014). These ranged from DWS officials (from both the national and regional offices), consultants and the epistemic community (e.g. academics), local government (both district and local municipalities), the public in general and specific water users (Meissner and Funke, 2014). This diversity of actors or agents (actors that has the ability to bring about change) suggests that there are multiple variables and knowledge systems involved in the establishment of CMAs. It also means that the political influences will come from these actors.

2.3 Conceptualising 'causation' or causal relations

This section of the framework for analysis is heavily influenced by the work done by Milja Kurki from the University of Aberystwyth, Wales. In her seminal publication entitled *Causation in International Relations: Reclaiming Causal Analysis* Kurki (2008) outlines two forms of causation. The first is based on the work of David Hume (1711-1776) who noted that causation has a number of assumptions. One premise is that cause or causal relations are linked to regular patterns of occurrences. As such causation is tied to the study of patterns or regularities. Hume also argued that causal relations are regularity deterministic meaning that based on certain observed regularities, when one type of event occurs, and then it is assumed that another type of event will follow. Causes are also efficient causes meaning that they push and pull (Kurki, 2008). According to Kurki (2008: 6): 'These assumptions about the concept of cause are deeply embedded in modern philosophy of science and social science…' This has led to a positivist interpretation of causal analysis. What is more, this interpretation is seen as the only acceptable way of doing causal analysis in the social sciences. The practical sense contained in theoretical assumptions has evaporated so to speak, and a narrower conceptualisation of cause has taken root. This means that causal relationships are observed and investigated in a linear fashion. This is the case in the water discourse where arguments like the following are put forward: '…effective governance is influenced by economic, social and political configuration aspects, which when they lack integration lead to instability in balancing economic growth and sustainability' (Bob, 1998). In other words, a lack of economic, political and social configuration integration causes an unstable balance between economic growth and sustainability. This argument is a good example of regularities, contained in the statement that a lack of governance configuration integration leads to an imbalance in economic growth and sustainability.

There is, however, an alternative and just as legitimate explanation and interpretation of causal relations put forward by Hume. Aristotle's (384-322 BCE) account of cause and causation was much broader and deeper than the later Humean account of cause. Aristotle developed a typology of causes. These are material cause, formal cause, agential or efficient cause and final cause. An example of a material cause is that of marble from which a statue is shaped. Matter is quite fundamental in any explanation and Aristotle saw matter as 'indeterminate potentiality.' Matter is a cause of something through the provision of the material from which objects can be crafted. Without marble, a statue cannot be sculpted. Also, of importance are the properties of material or substance, since these properties can enable or constrain how the material can be shaped. The material is insignificant when considered on its own: it has no intelligence and needs an action to become a statue. This brings us to formal causes, which are the forms, ideas or essences of things. The formal cause of the statue would be the idea, image or shape thereof. These reside in the mind of the artist or sculpture with formal cause being the pattern or form of something. According to Kurki (2008: 27) '…formal causes define and "actualise" material potentiality into things or substances.' The primary sources of change are brought about by agential or efficient causes. These sources could be any 'agential mover' or an 'act of doing something.' So, the efficient or agential cause of the statue is the sculptor or the act of sculpting. Final causes are the purposes of the statue. For instance, we walk and do other exercise to be healthy and by stating this, a cause is assigned to the action (Kurki, 2008). Causes and speech acts are therefore interrelated. Take for instance the example of governance configurations and the balance between economic growth and sustainability put forward by Bob (1998). The integration of governance configurations comes about through the actions of individuals that are either directly or indirectly involved in the integration process. These individuals are the efficient or agential causes. The individuals or different groupings of individuals' ideas and thinking around how the configuration process should be executed are to an extent are the formal causes. This means that to argue for the integration of different governance configurations for balancing economic development and sustainability is only part of the investigation and analysis. The ideas and images on how to execute such a configuration also need to be investigated and explained. These are after all ideational sources of social relations.

The typology of causes described here is 'flexible and sensitive to pragmatic concerns of explanation' (Kurki, 2008: 28). Unlike the Humean restrictive notion of cause, the different types of causes outlined by Aristotle bring into focus intangible forces behind cause; ideas, norms, principles, beliefs as well as paradigms and theories. These intangible forces can be formal causes because they define the structure of social relations in that they relate agents to each other as well as their social roles and the meaning inherent in their practices. 'They describe the rules and relations that define social positions and

relationships, and hence can be seen as “that according to which” social reality works’ (Kurki, 2006: 207). In a sense these non-material sources of cause can be seen ‘constraining and enabling’ causes (Kurki, 2006).

The typology of Humean and Aristotelian causes are important considerations in the development of a framework for analysing the causal relationship between elements of South Africa’s catchment management agency process and its failures and successes. The reason for this is that the CMA establishment process in South Africa cannot only be explained through Humean cause and effect relationships because of the sheer number of state and non-state actors involved so far. The number of actors involved so far in the establishment process adds to the complexity of the process and to investigate complex causal relations are no mean feat. What is needed in investigating the complexity of the process and how failures and successes are brought about is an alternative and legitimate way of thin king about and investigating causal relations. It is here where the integration between Humean and Aristotelian explanations of cause are important. This integration agenda is therefore the theoretical foundation on which the framework is built. What we are arguing for is not a dismissal of Humean linear causal relations explanations, but for an integrative approach where Aristotelian explanations take their rightful place along positivist Humean explanations.

2.4 The Framework for Analysis

In the previous section where we discussed CMAs as places of learning, we mentioned that there is a diversity of actors involved in the establishment process. We also argued that the diversity of actors or stakeholders or agents is contributing to the complexity of the establishment process. A framework assisting in capturing the lessons learnt during the CMAs’ establishment need to take these diverse institutional, epistemic, paradigmatic and theoretical as well as actor dynamics into consideration.

Because we are confronted with a wide variety of actors or agents from an assortment of institutional (e.g. DWS), material (e.g. emerging and commercial farmers from the agricultural sector) and ideational (e.g. scientific community and consultants) structures, an analytic eclectic[6] approach could be the most optimal way of capturing the knowledge about the lessons learnt from the establishment of CMAs in South Africa. Sil and Katzenstein (2010a: 21) have the following to say about analytic eclecticism and its treatment of epistemic divides.

[6] Analytic eclecticism is not an alternative model to research such as the qualitative or quantitative methods. It is rather an intellectual stance that researchers can adopt when doing research that does not fit established research traditions in the form of paradigms and theories in a particular discipline or field (Sil and Katzenstein, 2010b).

> ‘For the substantive questions on which analytic eclecticism is intended to shed light, assumptions concerning the ontological primacy of agency/structure or of material/ideational domains of social reality cannot be converted into a priori causal primacy of either agents or structures, and of either material of ideational factors. Eclectic research considers the different ways in which individual and collective actors […] form and pursue their material and ideal preferences within given environments. It also draws attention to the manner in which external environments influence actors’ understandings of the interests, capabilities, opportunities, and constraints.’

What this passage means is that if we would like to shed light on the question of the lessons learnt in CMA establishment, we should get rid of a priori assumptions about the nature of reality. ‘Reality’ comprised of agency, structure, material and ideational domains and the debate about which of these domains are more important in constituting reality. The focus of eclecticism is also not only on collective actors, like government departments and water user associations, but also on individual actors such as an emerging farmer or scientist. Analytic eclecticism determines the different ways how these actors chase their preferences (e.g. a more important interest in or desire for somebody than somebody else) and the role of external environments (e.g. water scarcity or competition over water) in constructing actors’ norms and identities. What is, however, the key aspect of analytic eclecticism, in relation to the development of the framework for analysis, is its focus on a middle ground between the agency/structure divide and the material/ideational divide. In other words, in any environment under consideration, such as a water management area over which a CMA has control, debates about the primacy of agency as opposed to structures are irrelevant because both play an important role in constituting relationships among actors. What is important to note is that all four domains are important in constituting reality. Not only that, a priori knowledge, or the knowledge that rest on rational intuitions or knowledge that is independent of experience (Russell, 2014), is undermined by analytic eclecticism. In other words, analytic eclecticism calls for the development of new knowledge that is not based on theoretical generalisations.

Take for instance the following statement: “[…] the CMA is the only legally recognised, permanent and empowered inter-sectoral organisational form with a specific mandate to engage in integrated water resources management and the water allocation processes […] One of the reasons for the mandating of CMAs in the 1998 [National Water Act] NWA was to enhance the democratic process of [integrated water resources management] IWRM” (Dent, 2008: i-ii). Dent (2008: ii) goes on to say that “leadership at all levels and places” will be an important variable to strengthen trust between stakeholders and prevent dysfunctional situations. He goes further to say that: “Trust is the one thing that changes everything […]” (Dent, 2008: ii). In other words, stakeholders should not only think in terms

of integrated water resources management to create a conducive environment for CMAs to function correctly (Dent, 2008). Dent (2008) makes a case for the role of agency to influence the structures put in place by the National Water Act, the CMAs. For him agency, facilitated by leadership is more important that the structure of integrated water resource management. He does not downplay the role of structures though. The Constitution of the Republic of South Africa and the National Water Act "demand sound relational responsibility from organisations" (Dent, 2008: ii). What Dent (2008) does not mention are elements from the material and ideational domains. He also makes an a priori state about trust that constitutes everything in relationships or at least constitutes everything good in relationships. Dent (2008) relies a lot on the writing of Peter M. Senge. In their book *The fifth Discipline Field Book* (1994) Senge *et al.* put forward trust as one of the most important variables that can lead to success in an organisation. Trust is a characteristic of a 'great team' (Senge *et al.*, 1994). The statement by Dent (2008) that from trust everything flows forth is an example of a priori knowledge because this is what Senge *et al.* (1994) claim and not what Dent (2008) concluded from doing empirical research.

This means that a single theoretical framework, like adaptive management, with its focus on social learning (Lee, 1999) would not suffice in the development of the framework. An a priori claim by adherents of adaptive management notes that: "Efficient, effective social learning, of the kind facilitated by adaptive management, is likely to be of strategic importance in governing ecosystems as humanity searches for a sustainable economy" (Lee, 1999: 3). This is not to say that such a claim is wrong, anything but! Yet, by looking for 'efficient and effective social learning' in the ambit of the lessons learnt in establishing CMAs, could detract the research team from elements that are situated outside this ideational structure-type of action. In other words, by focusing on one theoretical framework only will limit our ability to discover our ability to see how agency, structures and material elements play an interdependent role in the establishment of CMAs.

Another example to illustrate the point is to use Pahl-Wostl *et al.*'s (2010) management and transition framework. This framework is put forward in "supporting the analysis of water systems, management processes and multi-level governance regimes" (Pahl-Wostl *et al.*, 2010: 571). The framework is closely linked to adaptive management since it gives guidance towards the implementation of processes to move towards adaptive management. It embraces complexity (Pahl-Wostl *et al.*, 2010), but only in so far as the explicit acknowledgement of the agency, structure and material domains of reality. On the ideational it is quite silent and only goes so far as to explain the role of knowledge when actors perform certain actions (Pahl-Wostl *et al.*, 2010). On a paradigmatic level the framework is overtly rational or post-positivist. This means that it treats ontology (the nature of reality?) as a single reality that can be controlled and predicted. This is not to

say that the framework is wrong, anything but! Even so, amid its strengths it also has weaknesses.

By using these two examples it becomes clear that theoretical frameworks have their strengths and weaknesses. Not one theory can explain everything happening in the world (Aron, 1967; Albert and Buzan, 2013). Theories are creations of the human mind and so too are paradigms or the views we hold of the world. Said differently, how we generate knowledge will have a bearing on the way in which we analyse reality and come up with remedies to solve problems and create opportunities (Meissner, 2013). Cognition with the rationalist scientific method is also possible, meaning there is not only one dependable way of knowing (Eisner, 1990).

Having said that, we will develop a framework for analysis to identify and analyse the lessons learnt in the establishment of CMAs in South Africa. This framework needs to take into consideration the agency, structures, material and ideational divides that explain reality. The framework should also not be overtly rationalist or post-positivist and needs to cut across the entire paradigmatic spectrum incorporating rationalism, post-positivism, interpretivism/constructivism, critical theories and the participatory paradigm. *Attention will also be given to the politics influencing events and decisions.* To get to such a framework we will incorporate elements from a number of theoretical frameworks. These could include, but may not be limited to the following frameworks:

- The theory of adaptive management and pragmatism utilised by Sabine Stuart-Hill from the University of KwaZulu-Natal.
- Pahl-Wostl *et al*.'s (2010) management and transition framework.
- A framework to analyse water politics and governance in river basins. This framework utilises a social constructivist lens (Meissner, 2014) and is therefore an interpretivist type theoretical framework.

2.4.1 Adaptation to Change

Stuart-Hill (2015) argues that responses to change are crucial for government, society and the economy, especially in light of climate projections showing a changing global climate over the next century. Although she highlights responses to change or adaptation in the face of climate change, adaptation can also be applied to any situation where change is occurring. This is the case in the institutional or legislative environment enabling the establishment of CMAs. Stuart-Hill (2015: 3) goes on to say that '…water resource management needs flexibility when considering new insights', with adaptation focusing on the way water resources are used and managed by society (Muller, 2007; Stuart-Hill, 2015).

To advance her argument for adaptation, Stuart-Hill (2015) goes on to say that adaptation cannot be dealt with through formal rules and legislative policies but has to be done in accordance with innovative ways. In other words, panaceas are not the way to go when considering adaptation to new situations. In order to be adaptive, the knowledge and tools that individuals will use, need to reflect the characteristics and/or abilities to adapt to several levels and scales (Stuart-Hill, 2015). To achieve adaptation, the following are needed:

1. A good understanding of water-related systems and their interdependence with other systems. This will enable the uptake of new information and help policy makers to be flexible to change.
2. Constant knowledge creation by groupings of individuals as well as integrated assessment and joint decision-making by difference groupings (Stuart-Hill, 2015) when adapting to new situations.
3. Policies and strategies that are implemented and adjusted (Stuart-Hill, 2015) as new situations and issues arise.

In this regard, research can ask a number of questions.

1. *What changes did occur in the past and how did the established CMAs deal with it?*
2. *How are the proto-CMAs dealing with changes in their environment?*

Both these questions ask about changes in general because we assume that the changes will in any case be water related since the environments the CMAs are operating in are water related.

3. *To what extent are the CMAs flexible in the policies and strategies they are implementing?*
4. *Are the CMAs following any panaceas, cure-alls or quick fixes to adapt to a new situation?*

It is important to note that adaptive management can become a panacea itself, if its theoretical underpinnings are implemented without due consideration of alternative viewpoints and theoretical considerations. Adaptive management deals with environmental systems and is often silent on the role of actors or agents and how they are able to deal with change. What is more adaptive management does not problematise change adequately. What we mean by this is, that it does not engage with change as a concept and look into the different facets of change and whether there is more than one type of change. Because of these limitations it will be possible to add some more insight and components to the framework to get a more nuanced picture of what is going on regarding the lessons learnt around the establishment of South Africa's CMAs. We will

therefore turn to Pahl-Wostl *et al*.'s (2010) management and transition framework for more guidance.

2.4.2 Management and Transition Framework

Pahl-Wostl *et al*.'s (2010) management and transition framework also leans on the theoretical underpinnings of adaptive management. The framework defines a number of boundaries of which the first is the water system. This system comprises of environmental and human components. The water system has a number of attributes like climatic conditions, geographical location, size of the river basin and relevant system indicators like water stress or water scarcity (Pahl-Wostl *et al*., 2010). Then there is the ecological system. Components of this system include environmental services and environmental hazards. The characteristics of this system include water availability, biodiversity, and degree of human influence, water quality and the storage capacity of the natural system. The environmental services are the number of service provided by the environment to human activities. The environmental hazards are the threats the ecology poses to human society. A third boundary is that of the technical system. This is the infrastructure that are relevant to water management such as irrigation canals, boreholes, dams, weirs, waste water treatment plants. The characteristics of this system include scale, lifetime, maintenance and ownership. Then there is the societal system. This system contains a number of action arenas and attributes are culture, extent and degree of inequality, economic growth and the strength of formal institutions. The action arenas focus attention on actors, actions and management goals. There is also a so-called management paradigm that determines the preference for certain kinds of solutions (e.g. the panaceas we referred to above) or strategies for managing risks (Pahl-Wostl *et al*., 2010).

Action situation are described by Pahl-Wostl *et al*. (2010: 574) as events '…in which participants with diverse preferences interact, exchange goods and services, solve problems, or develop new rules.' They go on to argue that an action situation boils down to the interaction among individual actors negotiating specific problems. Then there are also so-called 'aggregated interactions' involving collective actors whose actions lead to general policy frameworks. In other words, the conclusion of individual actors' actions and collective actor actions are knowledge and institutions, respectively (Pahl-Wostl *et al*., 2010).

To capture the nuances of Pahl-Wostl *et al*.'s (2010) management and transition framework, the research team could consider the following questions regarding the lessons learnt in the establishment of CMAs.

1. *Which environmental and human components define the boundaries of the CMA system?*

2. *How do the environmental and human components interact to define the boundaries of the CMA's organisational and strategic functioning?*
3. *What role does the technical system play to define how the CMA will operate in future?*
4. *What is the nature of the management paradigm and how did the actors arrive at that specific management paradigm?*
5. *What is the nature of the actions between the actors to solve problems and the developing of new rules?*

We should also take note that the management of a river basin can take on a different form depending on the type of river. Here we make a distinction between a river located within the boundaries of a country and a transboundary river, or river that is shared by more than one country. Pahl-Wostl *et al*.'s (2010) management and transition could be used to investigate a transboundary river. However, the framework does not explicitly talk about transboundary rivers. This is an important consideration to keep in mind, because South Africa shares numerous rivers with other countries, including the Inkomati and Usuthu Rivers (Turton *et al*., 2004), which already have a functioning CMA (Meissner and Funke, 2014). The Orange River and its tributaries, like the Vaal River and the Limpopo River, with its major tributaries, like the Olifants River, will all be governed by a CMA in future. These rivers are transboundary in their own right. What is more, even though a river basin might not be shared with another country, the CMA could establish international relations are an organisation level. To capture the nuances of the international relations dimension of the establishment of CMAs we no turn to a component of the framework that deals with transboundary issues.

2.4.3 Agency in Transboundary Rivers

The agency in transboundary rivers had been developed by Meissner (2004, 2005), advanced by Meissner and Jacobs (2014), Meissner and Ramasar (2014) and Meissner (2014). Pahl-Wostl *et al*.'s (2010) management and transition framework shows a number of similarities with the agency in transboundary rivers framework. For instance, both frameworks define the river basin along its geographic and climatic boundaries and the actors involved. Nevertheless, the agency in transboundary rivers framework adds a component called the hydropolitical history of the river basin or the issue at hand (Meissner, 2014), like the establishment of the CMA. This framework also investigates the actors' power capabilities and the type of interaction between the actors (Meissner, 2014) (something also captures by the management and transition framework).

The description of the river basin or issue's hydropolitical history serves a number of purposes. It shows which type of actors had been the most dominant in the system during

certain periods (Meissner, 2014) of the river's water management. This investigation of the actors looks at '…the nature and extent of the relationship between the actors over time' (Meissner, 2014: 4). Investigating the hydropolitical history, gives the researcher valuable information about the some of the variables such a changed political system or climate variables and the entry of new stakeholders on the scene that could have a bearing on the system's performance. This type of investigation could also show under which circumstances actors start to initiate influence during the policy process (Meissner, 2004; Meissner, 2004; Meissner and Jacobs, 2014; Meissner and Ramasar, 2014). The potential contribution that the hydropolitical history could also make in the establishment of CMAs and the lessons learnt, is to indicate the governance configurations during certain periods of the rivers management. These governance configurations could indicate how actors interact with one another, with two broad classes of interaction observable: competitive and complementary interaction. Competitive interaction shows a clash with the fulfilment of goals among the actors, while complementary actions between the actor's manifests in cooperative endeavours. It should be noted that conflict and cooperation cannot be neatly separated and coexist in a complex manner (Meissner, 2004; Meissner, 2014).

Returning to governance configurations, there are two types of governance. The first type we will call institutional governance, where Governance refers to the establishment of laws, policies and rules for processes and structures regarding resources management and sustainable development. The legislation and frameworks established through governance require continuous monitoring of their implementation by the members of the governing institutes and bodies respectively (Rijke *et al*., 2012). Additionally, effective governance is influenced by economic, social and political configuration aspects, which when they lack integration lead to an instability in balancing economic growth and sustainability (Bob, 1998). The second type of governance is interactive governance (Kooiman, 2008), which is often not harmonious and depends of the interaction of a number of actors and their interactions (Kooiman and Bavinck, 2013) to ameliorate problems and create opportunities. The actors in this type of governance are not all governmental actors or are not necessarily aligned to the governmental apparatus of the state. In other words, in interactive governance, the actors can all be non-state state actors in a non-state actor governance configuration. What is important to note though is that the water resources strategy and governance structures in the river basin have to be integrated to improve optimum infrastructure. This will result in sustainable water resources management. In water resources management programs, DWS will contribute and assist in water resources protection and usage and management strategies formulated by the CMAs and further participate in CMAs implementation (Meissner and Funke, 2014). The agency in transboundary rivers framework can assist in ascertaining

the degree to which water resources strategies and governance structures produce desirable outcomes.

Important questions that need consideration by the research team are the following.

1. *What processes in the DWS are enabling and/or constraining the establishment of catchment management agencies since the implementation of the National Water Act in 1998?*
2. *How have relationships with actors inside and outside the river basin changed over time?*
3. *What was the most predominant relationship between the actors over time; conflict or cooperation?*
4. *What is the nature of the governance configurations over time?*

2.5 Conclusion

We believe that to capture the nuances of the lessons learnt around the establishment of CMAs in South Africa that a one-size-fits-all framework will not suffice. This is because the finer nuances of a complex process like CMA establishment will not be captured by a single framework. Above we have outlined three frameworks to move towards an integrated framework that will help resolve some of the issues in CMA establishment. The three frameworks, adaptation to change, management and transition and agency in transboundary rivers, had been followed by a number of questions to capture the finer nuances of the lessons learnt. With this we are not saying that this integrated framework is the last say in the development of a framework to investigate the lessons learnt. By no means will this framework capture everything we need to know about the lessons learnt. However, we believe that it is a step in the right direction and will start a debate that will assist policy makers and scientists in getting to a deeper understanding of CMA establishment. The key questions established (*in italics*) within in each described framework above, have guided all inquiries, interview processes and conversations that have informed the final lessons learnt and recommendations extracted from this project. Based on this framework the analysis is envisaged to be more ‘real’ and thus, more relevant in order to create recommendations that cannot ensure but support successful catchment-based management and governance in South Africa.

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CHAPTER 3: THE ESTABLISHMENT AND EVOLUTION OF RIVER BASIN ORGANISATION IN SOUTH AFRICA AND ABROAD

Parts of this chapter are taken in its entirety or partially from an MSc dissertation (cf. Section 3.2) and an Honours project (cf. Section 3.4):

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3.1 Introduction

Water resources across the globe are coming under increasing pressure as a result of economic and social development. Conventional management methods are unable to cope with these ever-increasing demands; hence the focus has shifted towards an integrated approach to water resources management (Goldin, 2008; Gleick, 2003). Water is not an entity on its own, it affects various aspects such as economic development; it is a source of livelihoods and often can be considered a source of destruction (floods, droughts). As a result, water is often a reason for conflict and is viewed as a highly political issue (Gleick, 2003). However, if adequately managed, i.e. in a sustainable manner incorporating the three pillars of sustainability (the environment, society and the economy), water availability and access to it can enhance the development of a country (Herrfahrdt-Pähle, 2012).

It needs to be taken into account though, that water resources are an integral part of the global change agenda, and at the same time are subject to changes themselves (Hoff, 2009). The availability of water has the ability to limit or accelerate change, depending on the quantity of the resource. Changes to the resource itself result from land use changes, pollution, climate change and the demands of society (Hoff, 2009; Herrfahrdt-Pähle, 2012). Therefore, the management of water resources is complex and these complexities have encouraged new management approaches (Pahl-Wostl *et al.*, 2011; Pollard and Du Toit, 2008). As a result, the manner in which water is managed will have positive or negative consequences on society, the economy and the state of the resource itself. Water is related to numerous other natural resources, so a change in water supply or, for instance, in land use, would result in changes to the water resource and vice versa (Hoff, 2009). Water also has an effect the way in which we plan, for example, housing developments are not built on flood plains owing to the risks and vulnerability associated with flooding. Traditional management approaches are limited and costly (Gleick, 2003) in coping with the interrelatedness between water, other natural resources and society, hence the need for an integrated approach to sustainably manage water resources for the benefit of all (Hoff, 2009; Pahl-Wostl *et al.*, 2011; Pollard and Du Toit, 2008).

Globally, the trend in water resources management policies is to manage water at a catchment level, with the participation of all relevant stakeholders and aiming at the sustainable development of water resources. All these aspects highlight the importance of the environment the river, catchment and stakeholders are located in (Bourblanc, 2012). This is why Integrated Water Resources Management (IWRM) was developed as an alternate approach when dealing with the management of water resources and challenges past management techniques (Pollard and Du Toit, 2008). IWRM promotes the management of water in a holistic manner, which emphasises participation, and environmental awareness, highlighting that water resources are connected to societal and developmental elements (Pollard and Du Toit, 2008). This approach strongly emphasizes a “bottom-up” approach to water management. IWRM aims to provide a balance between the use of water resources for livelihoods and development whilst protecting the resource for future generations, by promoting equity, environmental sustainability and economic efficiency (Pollard and Du Toit, 2008). These principles of IWRM are strongly embedded in South Africa’s National Water Act (NWA) of 1998 (Bourblanc, 2012; Pollard and Du Toit, 2008).

South Africa is considered a semi-arid region hence the importance regarding the efficient use of water is highlighted. The country also experiences variable rainfall patterns, with some areas such as the Western Cape receiving winter rainfall whilst the eastern and central regions receive summer rainfall (Golding, 2008). This variability adds to the complexities regarding the management of water resources in South Africa. Water plays

a crucial role in South Africa and the NWA of 1998 recognizes this in that the Act and its relating policies emphasis social and economic development through water (Bourblanc, 2012). The NWA also recognizes that passed laws and practices prevented the equitable access of water for everyone (Golding, 2008). As a result, DWAF made the water sector a priority in demonstrating the willingness to abolish past inequalities (Bourblanc, 2012). The history of South Africa indicates that water plays a central role in the country's development (Swatuk, 2010). Therefore, in order to address and redress the water needs of the country, the NWA of 1998 promotes the decentralization of, and participation in water resource management (Sherwill *et al*., 2007). This is to be attained through the establishment of 19 Catchment Management Agencies (CMAs), one for each of the then 19 delineated Water Management Areas (WMAs) (Sherwill *et al.*, 2007). However, 15 years after the promulgation of the NWA, there are only two operational CMAs, *viz.* the Breede-Overberg and the Inkomati CMA. The current initiative to push for the establishment of the 9 newly gazetted CMAs (March 2012, by Minister Mrs Edna Molewa) in a short and structured approach has given hope to many, that still believe in the potential that CMAs would have for sustainable growth and development in South Africa.

As CMAs can be understood as central actors in a specific water governance set-up, we may draw on lessons learnt from their establishment. But these need to be seen and understood in their specific environmental, societal and historical context as alluded to beforehand. If this is done in a reflected and transparent manner, taking lessons from the two established CMAs, on their establishment and operations as well as successes and failures, can serve as a guide to the establishment of future CMAs in South Africa. Thus, in Section 3.2 we will focus on the seemingly successful establishment of the two operating CMAs (the Breede-Overberg CMA (BOCMA) and Inkomati CMA), as well as other relevant processes linked to the establishment process that have occurred over the past 15 years, since the inception of the NWA of 1998. For this, events have been mapped on a timeline, such events are not merely meetings or promulgation of legislation, but include functions, political happenings and others. Only when documented in detail and complemented with lived experiences of decision-makers and stakeholders, processes of learning and change can inform future practitioners, stakeholders and interested parties that are participating in similar processes. As alluded to earlier, the minister has gazetted 9 WMA and CMAs respectively in 2012. Aiming at a short and structured approach in order to ensure success of the establishment of these 9 CMAs until 2017, the project team has also reflected on two Proto-CMA processes, these being the Vaal in Gauteng and Free State Provinces and Pongola-Umzimkulu in KwaZulu-Natal. These reflections can be found under Section 3.3. To that effect it may also be possible to transfer knowledge to other countries and therefore, lessons learnt could also be established in other areas and serve as a guideline for South Africa. This is where the context becomes key. Australia has been chosen by the project team as a case in point

and is being discussed and presented in Section. 3.4. The comparison between the specific contexts of Australia and South Africa highlights specific aspects that are influential for successes and how challenges could be overcome. In Section 3.5 we reflect on CMAs in reference to one example of a catchment-based organisation in Germany, i.e. Flussgebietsgemeinschaft Elbe. This is done to illustrate the similarities and differences in the experience of establishing a river basin organisation in a developed and developing country.

3.2 A timeline analysis of the establishment and operations of the IUCMA and BGCMA

The aim of this section is to construct a detailed timeline of events leading up to the establishment of the Breede-Overberg (BOCMA) and the Inkomati CMA (ICMA) as well as the operational history of the CMAs to date. From this timeline, focus would be on events occurring within the CMAs and external events relating to CMAs that have either had positive or negative impacts on the establishment and operation of these CMAs. From this, important lessons will be learnt enabling future CMAs to be more effective and efficient. An assessment will then be carried out with regard to:

- The delegated tasks by DWA to date.
- The capability of the CMAs to carry out these delegated tasks.
- The difficulties that exist in regard to implementation.

One focus will be on the influence and role of DWA head office and regional office in regard to CMA functioning. As alluded to earlier in the document, there seems to be a significant element of tension between these two organisations. Finally, it is envisaged to gain insight into how the establishment of CMAs affected water resource management in the regions (stakeholder's needs, environmental objectives, social and economic development) as well as the status of the resource itself. The main research question is: What is the history of the establishment, operation and evolution of the Breede-Overberg and Inkomati CMAs to date? Other questions established are:

- What processes have had an either positive or negative impact on the above-mentioned CMAs?
- What is the actual role (delegated by DWA) of the CMAs and to what extent has DWA influenced CMA management?

The relevant data was gained through an extensive review of both the Breede-Overberg and the Inkomati CMAs in order to develop a timeline of influential events regarding the establishment and further development of the two mentioned CMAs. Once this was done, aspects of significance were highlighted and looked into so as to ascertain a better understanding of that specific event and its influence on other events on the timeline.

Organisational issues and operational structures were also taken into consideration. Furthermore, interviews were conducted with staff and stakeholders. These interviews provided further insight with regards to:

- The effects of events on staff morale and administrative processes,
- the general operation of the CMAs and their effectiveness,
- and a better understanding with regard to the role that DWA plays when looking at successes and challenges of CMAs.

3.2.1 Methodology

This section will be divided into 4 components, each of which relate to and follow on from one another. Firstly, a questionnaire was developed so as to address key issues identified within the literature. This is then followed by the construction of a timeline of events for the above-mentioned CMAs. This then follows onto the design of interviews to be conducted with key personnel to gain further insight into processes, perceptions and other drivers of evolution.

Based on findings from a literature review, a number of issues with regards to the establishment and operation of CMAs in South Africa have become prevalent (Meissner e*t al*., 2013; Meissner and Funke, 2014; Bourblanc and Blanchon, 2013; Dent, 2012). These are financial constraints, knowledge capacity (skilled and experienced professionals), trans-boundary issues, Institutional arrangements (CMA-DWS relationships), co-learning and stakeholder participation (see Box 3.1). It is important to note that these issues were identified through a literature review, therefore they may not necessarily be issues currently experienced by the CMAs.

Financial constraints

Experienced by the CMA with regards to operation, and costs incurred by the national authority (DWS) in establishing a CMA.

Knowledge Capacity
(Skilled and Experienced professionals)

Lack of adequate knowledge with regards to the role and functions of a CMA, by CMA staff and the national authority (DWS).

Skilled and experienced professionals

Lack of individuals with the relevant knowledge and skills employed within a CMA.

Trans-boundary Issues

Reaching agreements with downstream users (neighbouring countries) in terms of water volume and quality.

Institutional Arrangements
(CMA-DWA relationships)

The relationship between the CMA and DWS. Is there cooperation between the two authorities and to what extent?

Co-learning/Adaptive capacity

The ability of the CMA to adapt to changes, whether they are climatic changes or changes in national legislation. Does the CMA create a space wherein employed individuals can share knowledge with each other, or other organisations.

Stakeholder participation

The level at which CMAs interact with stakeholders. Are there any limitations? The opinions of stakeholders towards the CMA. Are the stakeholders satisfied with what the CMA offers?

Box 3.1: Prevalent issues for the establishment and operation of CMAs in South Africa

Furthermore, for the construction of the timelines, a review of available literature was conducted and important events together with their timestamp were noted. The timeline consisted of events occurring during the establishment and operational phases of the

CMAs. Other aspects not directly involved in the establishment and operation of the CMAs were also considered. These events, such as the National Water Resource Strategy (NWRS) and ministerial decisions, also have direct impacts on the CMA. The impact of these “external events” on CMA operation will also be divulged.

In order to gain further insight into the issues listed above, questionnaire surveys were conducted, focusing on the two operational CMAs. The aim of these questionnaires was to gain deeper understanding with regard to the aforementioned issues and to identify other key issues that may arise. The questionnaires were designed to allow for the personal opinions of individuals to be highlighted. Since CMAs focus on social aspects, it is important to get the opinions of those affected and involved within the CMA space as this would lead to effective and efficient water resources management. Furthermore, it was envisaged that other important issues, which are not discussed in current literature, could also be highlighted. Such issues may be of greater significance than those highlighted in the literature. Overall the questionnaires will underline key issues faced by the CMA and the stakeholders. The survey was conducted in a targeted manner to specific groups that have been identified within the CMA environment. These were:

- CMA operating staff
- Stakeholders
- Governing board members

The questionnaires for this survey varied in length, detail and language depending on the target group. In order to gain an even deeper insight into the daily operation of the above-mentioned CMAs, interviews were conducted with key individuals from the same groups as the survey was conducted with. Key individuals were identified by nature of their position within the above-mentioned groups. The purpose of these interviews was to provide additional information that may not have surfaced through the questionnaire surveys.

Another aspect, which the interviews were aimed at, was addressing the evaluation of important events for the timeline, as there are “gaps” from purely reviewing literature and governmental documents. The timeline is an important aspect of the project as it provides a base from which valuable lessons regarding the establishment and operation of the CMAs can be gathered. This is especially true for events that may have not been recorded by other actors, scientists or governmental officials yet.

The combination of the literature review, surveys and interviews are assumed to provide a thorough analysis of the variety of events that influenced the CMAs’ establishment and operations.

3.2.2 Constructed timelines

The following influential events have been identified with regard to the ICMA and BOCMA respectively. Please see Annexes 1 and 2 of this research report for further details, especially the spacing of events on the timeline and clustering of specific events. All institutional and catchment-based activities respectively have been highlighted in grey:

Table 3.1: Timeline for the ICMA and IUCMA respectively

DATE	MILESTONE RELEVANT FOR ICMA
9/15/04	First NWRS published.
1/1/05	DWAF (now DWS) establishes ICMA by appointing Governing Board (GB). GB not trained in water management
12/1/06	Begin the appointment of operational staff
1/1/08	Institutional realignment begins at DWA. 3 Year Debate about the need for CMAs.
1/1/08	3 year period of uncertainty about the future of ICMA
8/15/08	ICMA hosts Catchment Management Indaba
1/15/09	Wits team introduces SAM as a planning and decision-making system that can be used to facilitate the switch from setting up to practical IWRM
2/15/09	Wits team begin Adaptive Planning Process (APP) of Strategic Adaptive Management (SAM) to develop a future approach to IWRM in the Inkomati
3/1/09	DWA forgets budget for CMAs in 2009/2010 financial year.
5/1/09	CEO leaves ICMA. GB tries to compensate by taking on managerial activities. APP process matured and initial outcome forms basis for new business plan. This is rejected by the GB.
5/31/09	DWA rejects new business plan and accuses ICMA of duplicating DWA functions.
6/1/09	"Farmhouse" SAM workshop held. 5 IWRM objectives accepted by GB.
9/15/09	Consultant hired to complete CMS runs out of budget. 3 IWRM projects added which are designed to address specific stakeholder needs.
10/15/09	ICMA staff meet minister and present IWRM Strategy
10/15/09	DWA unable to explain to parliament why CMAs are necessary for IWRM
12/15/09	Minister announces that ICMA must produce CMS by the end of the financial year
4/15/10	Timeous budget from DWA for the first time.
12/15/10	CMS Accepted by the Minister
1/15/11	Reporting to GB is in the bureaucratic format; two meetings to resolve this. APP outcomes played a key role.
4/15/11	CMS and SAM presented to portfolio committee
4/15/11	5-year strategic plan for CMS implementation produced
7/15/11	No cooperation from DWA regional on staff transfer to CMA
7/15/11	DWA does not include ICMA in the process of setting water tariffs.

8/15/11	Lower-Komati and Sabie forums re-launched. Good stakeholder focus in line with SAM APP process
11/15/11	Limpopo Univ. team conducts project to determine what has been learnt and promote further learning
1/15/12	Acid Mine Drainage at Carolina. First pollution test for ICMA.
2/15/12	DWA hires consultant to develop business plans for WUAs. ICMA not consulted
6/1/12	Government Gazette. Minister reduces number of WMAs from 19 to 9.
3/15/12	DWA presents a draft business plan for Usutu. Fails to contact ICMA.
8/15/12	First stakeholder meeting for Upper Komati. Issues raised.
6/15/13	NWRS 2 Published
7/26/13	Government Gazette. Proposal for the establishment of the Inkomati-Usuthu CMA.

Table 3.2: Timeline for the BOCMA and BGCMA respectively

DATE	**MILESTONE RELEVANT FOR BOCMA**
10/15/99	Broad process begins in Overberg region
11/8/99	Initial public meeting to introduce BRBS and suggest interested parties
11/15/99	Public meetings in Overberg region to inform public, identify stakeholders involved in CMA establishment Process
3/1/00	Further meetings held to share info, regarding the CMA and establishment process.
3/4/00	Second meeting held. BRBS Stakeholder Committee established,
4/13/00	BRBS stakeholder committee meets for the first time.
6/20/00	Membership of the Overberg stakeholder committee finalised. Further meetings continued up to April 2002.
9/5/00	BRBS stakeholder committee meets. Discussion around CMA establishment and a CMA Reference group.
11/15/00	BRBS and Overberg stakeholder committees meet for the first time (now Breede WMA stakeholders forum). CMA reference group established.
8/21/01	Breede-Overberg CMA group meets. Feedback on CMA dev. and methods to improve disadvantaged community participation discussed.
11/2/01	Breede WMA stakeholder forum meets for the 2nd time. 2nd draft of the CMA proposal discussed.
2/1/03	Draft CMA proposal sent to DWAF.
12/3/03	CMA reference group meets to discuss changes to CMA proposal and Financial viability
12/5/03	CMA reference group meets. Issues regarding NWRS added to CMA proposal. Proposed that CMA be called Breede-Overberg.
8/15/04	CMA proposal developed
9/15/04	First NWRS published.

6/15/05	*Minister establishes CMA.
9/15/07	BOCMA GB appointed.
11/15/09	Meetings regarding CMS development begin.
3/2/10	Initial meetings regarding CMS development raise concerns from stakeholders. Feel BOCMA not capable.
5/13/10	Networking meeting held with all provincial role players. Aim was to determine planning strategies and effects on future development.
5/1/10	Sectors and stakeholders feed into vision for CMA.
5/5/10	Letsema project begins. (applications and issuing of water licenses)
5/20/10	CMS "visioning" meeting held.
7/15/10	Stakeholder meetings held. Discuss management, finances and institutional capacity.
11/15/10	CMS developed using options available.
2/15/11	CEO resigns
4/15/11	BOCMA sends a team to Netherlands. Dutch have vast experience with CMAs.
4/30/11	Water forums are being established in local communities.
5/15/11	Delegated powers from DWS. Registration and water use validation. Management in support of CMS implementation. Institutional development with emphasis on water
5/15/11	Aurecon entrusted to carry out validation and verification on behalf of BOCMA.
6/15/11	Villiersdorp forum involved in water management.
7/4/11	CMS on the verge of being approved and gazetted.
7/4/11	BOCMA acts as a support team for water licensing
9/30/11	DWS presents state of rivers report. CMS to include these findings.
11/11/11	Public Participation meeting on IWRM.
1/2/12	BOCMA focuses on alien invasive.
1/6/12	Partnerships formed with Waternet, World Waternet and company from Netherlands.
3/15/12	CEO Returns
3/20/12	Water week. BOCMA reaches out to schools.
4/1/12	Masazane water forum meets with BOCMA.
5/15/12	BOCMA joins local community to clean up Klipdrift River.
6/1/12	Government Gazette. Minister reduces WMAs to 9.
6/6/12	Wetlands trip carried out.
7/15/12	Gazetted CMS made available to stakeholders for comments.
8/6/12	Mondi wetlands group meets with BOCMA.
9/1/12	CEO meets stakeholders to hear opinion and issues.
10/18/12	Workshop on co-operation. BOCMA signs memorandum of agreement with Olushandja Sub-basin in Namibia.
12/10/12	21 WUAs established in Breede WMA. BOCMA to provide assistance by aiding with water use registration and authorisation.
6/15/13	NWRS 2 published.

7/15/13	DWS official visit BOCMA. Experiences and knowledge shared.
8/1/13	BOCMA receives positive feedback from the Minister.
9/1/13	Masazane water forum receives award from DWS.
9/15/13	Zambian officials visit BOCMA. Knowledge shared
10/15/13	BOCMA staff and CEO attend workshop for NWPR.
12/13/13	Gazette notice. Establishment of the Breede-Gouritz CMA.

3.2.3 Analysis

Breede-Overberg CMA

The broad process to establish BOCMA begins in 1999. Numerous meetings occur to gain insight and also identify stakeholders of the region. After stakeholders were identified, the Breede and Overberg stakeholder committees were then finalized during the year 2000. The two committees then met at the end of the year (2000), and a CMA reference group is established.

On the 21st of August 2001, members of the reference group meet and discuss the development of a CMA proposal. This was an extensive process, and a draft proposal was sent to DWS in January 2003, some four years after initial discussions begin. Further meetings occurred between stakeholders during 2003. This resulted in adjustments (including NWRS issues) being made to the draft proposal and the proposed name for the CMA was the Breede-Overberg CMA.

A final proposal developed during August 2004 and the first NWRS was published in September 2004. The CMA was then established by the Minister in June 2005, some 6 years after initial discussions. Two years later, a Governing Board was appointed for the CMA.

By looking at the timeline, it seems as though operation of the CMA began in late 2009 as there was a flurry of activities from November 2009 onwards. This was when discussions around the development of a CMS began, again 2 years after the appointment of the GB. After numerous meetings, a CMS is developed at the end of 2010.

February 2011, CEO resigns. This does not seem to impact BOCMA as activities continue as normal. However, he returns a year later.

April 2011, BOCMA sends a team to the Netherlands as the Dutch have vast experience with catchment management. A partnership was then signed with a Dutch company in June 2012. This included the sharing of knowledge and expertise as the Dutch have significant experience with water resources management.

Also, during 2011, management staff in support of CMS implementation was appointed, even though CMS had not yet been approved. This was also an important year for the CMA as it received its first set of delegated powers from DWS. These were the registration and water use validation of current water users. The CMA wasted no time in carrying out these delegations and appointed a consultancy to carry out the validation and verification on behalf of BOCMA. Later in 2011, the CMS is on the verge of being accepted by the CMA and being sent to DWS for acceptance and approval. However, during September of that year, DWS presents a state of the rivers report. The CMS is to include findings from that report, resulting in an overall delay in CMS approval.

During the month of July 2012, the gazetted CMS made available to stakeholders for comments. The CEO then meets with stakeholders to hear their opinions and if there are any issues with the current CMS.

In June of 2012, changes coming from the Minister resulted in the reduction of water management areas in South Africa, hence also reducing the number of CMAs needed. They were reduced from 19 to 9. Over a year later, through government gazette, the Breede-Overberg CMA was now called the Breede-Gouritz CMA including areas within the Gouritz water management area. This increased the operational jurisdiction of the CMA. However, the CMA has not begun with operations in the Gouritz area to date (as of August 2015). Also, a CMS is yet to be established for the BGCMA.

In an article to be published in Ecology & Society, Meissner, Funke and Nortje (In press) reflected on the establishment of the Breede-Gouritz CMA, and particularly on the politics of establishing CMAs. They did so by applying the framework of adaptive co-management and its institutional prescriptions: collaboration, experimentation and the bioregional approach. They also discuss the politics and strategies involved in the introduction of the CMA concept to the National Water Act and the latest developments around these institutions in South Africa. Meissner, Funke and Nortje conclude by reflecting on the future of operations of the new BGCMA and CMAs in South Africa in general. While their research has shown that BOCMA's establishment process has featured several elements of adaptive co-management and its institutional prescriptions it remains to be seen to what extent it is possible to continue implementing this concept when further developing and operationalizing the BGCMA and the country's other CMAs.

Inkomati-Usuthu Catchment Management Agency (IUCMA)

Initial discussions begin in July 1997 between DWS (then DWAF) and Komati Basin Water Authority (KOBWA) with the aim of establishing catchment management institutions for the sub-basins of the Inkomati (Waalewijn *et al*., 2005). A consultant was hired in May 1998 to facilitate the process of drafting a CMA proposal (Waalewijn *et al*.,

2005). Even though these initial discussions began in July 1997, the Inkomati-Usuthu CMA (then known as the Inkomati CMA) was only established in 2005. This took a period of approximate 9 years. It then took a further year the operational staff to be hired.

The first National Water Strategy (NWRS) for South Africa was published in September 2004. This was 6 years after the promulgation of the National Water Act (NWA) of 1998.

A period of 5 years elapsed since the establishment of the ICMA before a CMS was accepted by the Minister. The CMS was sent to the minister for approval in April 2010 and was accepted by the Minister at the end of 2010, a period of 8 months. This was some 5 years after the establishment of the CMA and the first NWRS was published.

According to Prof. Rogers of the University of the Witwatersrand, the year 2008 brought about uncertainty regarding CMAs. This lasted for a period of 3 years wherein DWS did not include CMAs in the 2009/2010 financial year; staff members were unsure even with regards to salaries for that year. During 2009, the strategic adaptive management (SAM) framework was developed in order for the CMA to conduct IWRM.

June 2012, the minister through government gazette reduces the number of CMAs from 19 to 9. Over a year later (26 July 2013), through government gazette, a proposal for the establishment of the Inkomati-Usuthu CMA was issued.

3.2.4 Conclusions

The establishment of both CMAs was both time-consuming, but at the same time highly inclusive and learning orientated. In order to promote stakeholder involvement large amounts of time was required during the initial stages. This can be attributed to the time needed to build trust a common ground of knowledge of the operational area. This was the same with regards to the development of a CMS. It seems that with processes of adding stakeholders or other conversational partners to the group of external actors to the CMA as well as reviewing strategic documents like the CMS timeframes are reduced by now and human as well as financial capacity has increase.

Changes within DWS did not affect the operation of the CMA directly but did have indirect and delayed effects. Formal decisions taken by the minister resulting in new bylaws, gazettes or NWA amendments that have some type of relevance to the CMA are highly problematic especially when not upfront communicated or discussed with the CMA. Such activities have the potential to make CMAs dysfunctional or at least frustrate and reduce moral amongst staff and stakeholders.

With an increase of operational area, the CMA has taken a long time to become actively involved in the new location. Another issue that was noted from the above timeline is that activities requiring government approval vary in terms of feedback, with come activities taking far longer than others. What are of major concern were the long periods between the initial establishment of the CMA, the appointment of a governing board and then the appointment of staff. In the case of the BOCMA, this took over four years. This needs to be addressed in order to enhance the efficiency of the CMAs.

The above timelines only briefly tell the story of both the establishment and operation of the CMAs. It is important to note that although there are employees with institutional memory; documentation around the history of the CMA was very limited, especially in the case of the ICMA. During our visits to the CMAs, employees were pressed for time; hence the focus was more on gaining lessons learnt, as opposed to the history of the CMA. The BOCMA does publish a newsletter every quarter, wherein events are noted. This was a major source of data for the BOCMA timeline above.

3.3 Reflection on Cases of Proto-CMAs in South Africa

This reflection and section respectively forms part of the interpretivist/constructivist research paradigm. We choose the qualitative research methodology because the interpretivist/constructivist's ontology, or nature of reality, is based on the notion that the researcher and reality are inseparable. In this regard, the researcher is both, the observation instrument and the interpreter of the observed results. There is, therefore, a life-world or lived experience in the reality of CMA establishment that needs exploration. Further it needs to be noted that this research paradigm views reality as mental constructs that are social and experienced-based, local, specific, constructed and co-constructed. In this regard, interpretivism's epistemology, or the relationship between the researcher and the things being researched, is that social reality is constructed through the actor's reference frame to the setting in which the actor is located (Angen, 2000).

To unpack this further, the research team had been conducting research on water resource governance and management for more than a decade. During this time, the researchers had attended numerous conferences and workshops on the issue of CMAs' establishment. One author is also part of the steering committee of the Pongola-Mzimkulu proto-CMA. She is, therefore, inseparable from the establishment process. In this respect, she can form mental constructs based on her lived experience as a member of the steering committee. This furthermore means that the lessons she learnt over the years were constructed through her reference frame to the setting of the steering committee. This means that the co-author was an actor, with agency in the establishing process of the Pongola-Mzimkulu CMA, and that her experience and reference frames will form part

of our gathered information. Interviews were also conducted with staff from the Vaal proto-CMA to ascertain how they are establishing the CMA and what lessons they have learnt so far. We conducted interviews with the chief executive officer (CEO) of the Vaal proto-CMA and a staff member of his.

One of the first lessons we identified regarding the establishment process is that getting structures off the ground is a demanding process. It is so because the initial activities involve a lot of issues. One of the first things that the aspirant CMAs, particularly those like the Vaal proto-CMA that covers a large geographical area, had to contend with was the long distances travelled by the various internal and external stakeholders (Pers. comm. S. Nevhorwa, 10 June 2015). Getting everybody together and travelling between the different parts of the CMA's WMA tax financial resources and requires substantial organisational skills and timing. Not only that, the Vaal proto-CMA also travelled to the Breede-Gouritz CMA (BGCMA) to learn from their established counterpart in the Western Cape (Pers. comm. S. Nevhorwa, 10 June 2015). Catchment management agencies are very much stakeholder focused and practice inclusive stakeholder engagement processes.

The two currently operating CMAs (BGCMA and IUCMA) followed a negotiation process guided by the regional offices of the DWS. In both cases a reference group was established, consisting of representatives from various sectors, such as agriculture, local government, emerging farmers and the tourism industry. The DWS was the most notable stakeholder assisted by private consultants. These consultants helped in the preparation of discussion documents, facilitation of meetings, and focused on the interaction with role players around concerns and suggestions of stakeholders in their specific regions. However, it does appear that at least management processes, after government direction, took on a more decentralised process with the involvement of various stakeholders from society and government.

As observed by the author being part of the establishment process of the Pongola-Umzimkulu CMA (PUCMA) there were several meetings from end 2012 to mid-2013 by the Steering Committee that led to the commenting on the Business Case. In July 2014 a CMF conference was held in the uMngeni catchment, but no further activities unfolded. Beginning of 2015 the call for Governing Board nominations went out, and a selection panel was appointed. In May 2015 the Acting CEO of the Proto-CMA was appointed. Queries on the further process were answered by "there are still a few internal issues which need to be addressed" and were hoped to be "sorted out in the next 2 to 4 months' time." Basically, since mid-2013 no communication has happened towards the stakeholders. Overall the process reflects a pure top-down approach; to a certain extent this is not a transparent process leading to a very powerful position of the regional DWS

office and the Acting CEO respectively. This is further increased by the presentation of a set organogram, which reflects the transfer of structures and staff from the regional DWS into the CMA. Based on the lessons distilled from the two operating CMAs this may be a too rigid and pre-defined process, through which spaces of learning and reflection are removed from the process of establishment and operation.

With regard to the dormant Steering Committee and Governing Board appointment process it can be assumed that the implementation of the Water Policy Positions (gazetted 30 August 2013), are hampering further engagement and operations. These Policy Positions include significant goal post changes for CMAs and Water User Associations. Based on experiences of the past decade in the water sector such goal post changes have led to a significant slowdown in developmental processes and organisational development due to the uncertainties created. This is furthered by many decision-makers still adhering to the top-down approach of governance and management based on the heavily centralised and command-control set-up from pre-1994. The result is an expectation of detailed tasks and activities to come with such changes in order to implement 'correctly'.

In contrast the interaction with the Vaal proto-CMA indicated a well-run process. We had interviews with a staff member from corporate services in DWS's Gauteng Regional Office as well as the proto-CMA's chief executive officer (CEO). Both employees indicated that they are in the process of establishing the CMA for the Vaal River catchment. They also reflected on the establishment and management process thus. One of the interesting aspects that emerged during the interviews was their willingness to engage with the established CMAs, particularly the Breede-Gouritz CMA (BGCMA). In 2015 employees from the Vaal proto-CAM undertook a fact-finding mission to the BGCMA to get first-hand knowledge of its management processes and how to move forward on the establishment process. The employees also told us that they are managing the hurdles regarding employee transfers and labour unions. The CEO informed us that he is constantly communicating to employees and the unions regarding progress on the establishment process in an effort to reduce fears and uncertainty. All-in-all, the process seems to be running smoothly.

It can be concluded that proto-CMAs may run very different types of establishment processes beyond the legally bound activities. Leadership and some type of goodwill seem to be relevant here. Also, both CMA cases were not operational as defined in this project. Thus, it needs to be assumed that proto-CMAs so far do not add to the decentralisation process of water management and governance in South Africa. And therefore, cannot initiate a transformative and more adaptive and tailored decision-making approach surrounding the country's water resources. It needs to be noted though,

that there was not enough capacity within this project to further engage in this topic. It is therefore suggested to initiate more detailed and focused investigations into these processes unfolding across the country.

3.4 Catchment-Based Management: Australia, an alternative approach?

Australia's political system is divided into states and territories, which all have their own legislation and are responsible for their own water resource management (ABS, 2004). These are all under the ruling of the Council of Australian Governments (NWC, Accessed 13 June 2015). The COAG is responsible for developing and initiating the National Water Initiative (NWI) which is a water reform framework, originating as a continuation of the water reform that started in 1994, signed on the 25 June 2004 it leads to the National Water Commission being established (NWC, Accessed 13 June 2015). The goals of the NWI as described by the Australia Government National Water Commission (NWC) are, to focus on ground and surface water resources for rural and urban use through an increase compatibility of nationality of water markets and as a method of regulating and planning-based system (NWC, Accessed 13 June 2015). This will maximize socio-economic and environmental production and development (NWC, Accessed 13 June 2015). The NWI allows for: increased inter-governmental cooperation, increased efficiency of water use, increase productivity and investment, environmentally sound manner, which promotes a healthy environment (NWC, Accessed 13 June 2015). On the 10th anniversary of the NWI in 2014 the NWC encouraged the Australian Water Association and Water Services Association of Australia to renew their commitment to the National Water Plan (NWC, Accessed 13 June 2015). This is envisaged to reinforce the efforts towards water conservation and planning for improved and more efficient water use throughout Australia. In order to achieve this an NWI implementation plan is required by each state and territory government, nine of these have been accredited by the NWC so far (NWC, Accessed 13 June 2015). The NWI has six objectives (NWC, Accessed 13 June 2015):

1. Prepare water plans with provision for the environment.
2. Deal with over-allocated or stressed water systems.
3. Introduce registers of water rights and standards for water accounting.
4. Expand the trade in water.
5. Improve pricing for water storage and delivery.
6. Meet and manage urban water demands.

These objectives will help with the implementation of the NWI, which will increase secure water access, affectivity of water planning, cooperative water resources management, help solve problems of over-allocation and overuse, help water managers and users adapt to changes in future water availability, i.e. increasing adaptive capacity (NWC,

Accessed 13 June 2015). The underlying assumption is that effective water resource management will support economically efficient water use in the long term and greater environmentally beneficial upshots, this will help save water resources and improve economic investment (NWC, Accessed 13 June 2015). It seems that in the past few years this assumption had to be heavily questions (pers. com. Pahl-Wostl, 2015)

3.4.1 Results

The authors identified five key themes for catchment-based management in a water scarce environment. These were development status, social acceptance, cultural considerations, and structure as well as stakeholder involvement.

The differences identified between the two catchment-based management case studies, i.e. Murray-Darling and Breede-Overberg, are described in Table 3.3 below. The developmental statuses are the main difference, as Australia is a developed country and South Africa a developing country. The social acceptance of BOCMA as an organisation has not had to deal with the issues of community protests that the MDBA has experienced. Both countries, on a national scale, support raising awareness around the importance of the scarce water resource and take into consideration the respective cultural history of the catchment. The review also has shown that previous disparities within South Africa create more of a struggle for equality on a catchment scale but are in the process of being corrected. Currently the structures of implementation differ as South Africa aims towards a decentralised management system that the IWRM concept promotes. Australia on the other hand currently reverts back to a more centralised management approach that gives the Australian Government significantly higher levels of authority. The latter reflects also on the level of stakeholder involvement where Australia only uses stakeholders on an information acquisition level, while South Africa aims at involving stakeholders to help design solutions and make decisions.

Table 3.3: Overview of the differences between the case studies with respect to the identified key themes

Case Studies	Development Status	Social Acceptance	Cultural Conside-ration	Structure	Stakeholder Involvement
South Africa's Breede-Overberg Catchment Management Agency	Developing and currently undergoing post-apartheid changes	Community support, raising awareness	Correcting previous disparities of Apartheid	CMA is responsible for producing a CMS, aiming for decentralised management system	Present on a decision-making level
Australia's Murray-Darling Basin	Developed with far lower levels of inequality	Raising awareness, knowledge spread to public, experiencing community protests	Acknowledged cultural burial ground and have protected the area around Lake Victoria	MDBA responsible for basin plan implementa-tion, moving towards centralised management system	Present on an information extraction base level

It needs to be clarified though that the MDBA started with a decentralised system of catchment-based management aiming to gain community support. It recently changed to re-centralising the management system, as it was felt that there was not enough authority at hand for such a decentralised set-up to influence state water management (Ross and Connell, 2014). With this change in approach the hope is to reach quicker decisions and ensure implementation of hard-decisions and changes in water use. This has though resulted in a severe loss of community support and unsatisfied stakeholders (Ross and Connell, 2014).

In contrast BOCMA started with very little community support and has slowly gained stakeholder acceptance through decentralised practices and involvement in all aspects of the community (Meissner and Funke, 2014). The challenge though is that decision-making is too slow to respond to emergencies and decisions cannot be taken in short time spaces, independently how urgent the decision is needed (Meissner and Funke, 2014). Furthermore, the lack of single source funding – as in the Australian case – has resulted in uncertain distribution of funds within BOCMA and across their activities (Meissner and Funke, 2014).

3.4.2 Conclusions

As identified in the literature implementation of catchment-based management should be flexible and decentralised. In the case of the MDBA the change in management approach to a centralised, national driven approach has led to political struggles and a loss in community support structures. The uncertainty of the MDBA reliability and its Basin Plan has become a point of concern with these changes in authority. Furthermore, the hard-set guidelines and structures of the current MDBA approach have not necessarily resulted in improved catchment management as the lack of flexibility have been a hindrance to implementation. The decentralised approach of the BOCMA has its own flaws in producing decisions within needed time frames as well as the lack of authority over water users in some cases. Enforcing the Basin Plan in Australia is easier with the government's support, while the CMS of the BOCMA has yet to be implemented completely as ground practices require change that is only happening very slowly.

It can be concluded that the differences alluded to above and in Table 3.3 are mainly due to drivers within the respective countries and their legal policies and frameworks. In the South African case the challenges of overcoming the apartheid related centralised governmental water structures and more or less unilateral decision-making culture while incorporating a decentralised approach is a dominating phenomenon that Australia does not exhibit with regard to any of the issues. In these case studies the economic or biophysical differences play a small role on whether a catchment-based management is successful. Due to the main issues for the Australian case being the lack of community support and limited stakeholder involvement and in the South African case being secured state funding and a pressure to implement in a shorter time frame, successful catchment-based management finally seems to be related to adequate political frameworks, commitment of communities and stakeholder involvement. It also seems that accepting longer time periods for change and securing funding for a variety of activities in the hands of the relevant CMA are needed for successful management and governance on a catchment scale.

Recommendations that can be made from this project include that the BOCMA (now the BGCMA) will have to reduce the time lines of their decision-making processes while still acknowledging and listening to stakeholders. The MDBA needs to focus on achieving community acceptance through awareness campaigns and stakeholder involvement. However, these aspects need further investigation to gain a deeper understanding of each case. Co-operation between the two would allow for an improved knowledge base and increase room for growth through lessons learnt from each other. As both countries are taking an adaptive management approach of managing as they learn such an initiative promises to deliver very fruitful lessons and recommendations for both.

3.5 The establishment of catchment management agencies in South Africa with reference to the Flussgebietsgemeinschaft Elbe: Some practical considerations

This section is taken in its entirety from a book chapter. Thus, results, statements, argumentations, etc. may be repetitive with regard to other sections of this report. The style of referencing and formatting is adhering to the guidelines of Springer and the book editors respectively.

Meissner, R., Stuart-Hill, S.I. and Nakhooda, Z. 2017. The establishment of catchment management agencies in South Africa with reference to the *Flussgebietsgemeinschaft Elbe*: Some practical considerations. In Karar, E. (ed.), *Freshwater Governance for the 21st Century*. Heidelberg: Springer.

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3.5.1 Abstract

The establishment of catchment management agencies (CMAs) goes beyond the involvement of government entities or the stipulations contained in regulatory structures and policies. A number of actors or stakeholders from both the governmental and non-governmental spheres are involved in establishing a CMA. Practices that are associated with CMA establishment go beyond regulatory mechanisms and often bring in personal experiences and the overall political landscape as well as administrative development trajectories. These are often also context specific to the respective catchment. We reflect on some of the administrative processes as a way to discern noticeable practices in the establishment of CMAs. Our case study material is the South African CMA establishment process to date. Some of the practices that come out strongly are human resource issues and financial accounting practices that decision-makers need to consider when establishing CMAs as a primary area of concern; also, an appreciative relationship to key stakeholders, meeting them at eye level is key. The chapter is based on research commissioned and funded by South Africa's Water Research Commission between 2014 and 2016. The process of establishing the *Flussgebietsgemeinschaft Elbe* in Germany is also outlined to illustrate the similarities and differences in the experience of establishing a river basin organisation in a developed and developing country.

Keywords: catchment management agency, administrative process, Breede-Gouritz CMA, Inkomati-Usuthu CMA, lessons learnt

3.5.2 Introduction

The establishment of a river basin organisation like a catchment management agency (CMA) might seem like a straightforward process where structures of rule, such as government Acts and policies, stipulate how and why such organisations need to be established. A perception like this can be deceiving, especially when one considers the role and involvement of various actors in the establishment process. The difficulty does not always arise in the interpretation of an Act but starts when one defines what governance is and what its purpose is, especially beyond management interventions and enforcement of law. For us governance is not only about government and legislation or the linear cause and effect constituted by causal mechanisms such as the drafting and promulgation of legislation. Governance is more complex and involves various feedback loops (e.g. Meissner and Jacobs, 2014) in any governance endeavour. Governance takes place at multiple levels in society and through multiple processes. The multi-level pathways of governance are influenced by both institutionalised governance mechanisms, like regulations, and non-institutionalised mechanisms such as norms and principles (Meissner and Jacobs, 2014). We define governance as (often non-harmonious) interactive socioeconomic and political forms of governing (Rhodes, 1996; Meissner *et al*., 2013) between various non-state and state actors, including individuals, to create opportunities and solve problems (Kooiman *et al*., 2008) in society. To reiterate, during this governance process, both institutionalised and non-institutionalised mechanisms are at play.

We argue that multilevel governance is at the order of the day when considering the case of South Africa's CMA establishment process. The CMA establishment process dates back to the late 1990s when South Africa embarked on a reform of its water legislation. Based on the participatory and open process of writing the White Paper on a National Water Policy for South Africa, the government designed and promulgated the National Water Act (No. 36 of 1998) in 1998. The Act is explicit on the CMA establishment process stating in exact terms how a CMA should be established, who should play what role and how the governing board of the organisation needs to be constituted (RSA, 1998). Furthermore, the Guide to the National Water Act (DWAF n.d.) and the public document Water Management Institutions Overview (de la Harpe *et al.,* n.d.) give more detailed definitions and guidelines that could assist the establishment process. Considering that governance is more than the activities emanating from government structures and legislative requirements, establishing an organisation like a CMA involves more than just government officials and the governing board of the CMA. Especially in the case of South

Africa abolishing the old Water Act of 1956 (Union of South Africa, 1956) and replacing it with a "new" Act that embraces the right to water and well-being as laid out in the country's constitution and emphasising the elements of integrated water resource management (IWRM) in various ways (Stuart-Hill and Schulze, 2010), the CMAs strongly represent social equity and transformation. Both these aspects are high on the political agenda in post-apartheid South Africa, and by implication are linked to high expectations from water users.

This chapter reflects on some of the institutional and non-institutional aspects of governance in establishing the country's CMAs. The first section of the chapter deals with the CMA establishment process thus far. In this section we briefly examine the process since the idea of CMAs was first mooted in the late 1990s. We then reflect on the practices that we had identified during the face-to-face interviews and stakeholder meetings we attended for the research project. We end with a discussion and conclusion in which we make a number of recommendations of key aspects for successful CMA establishment.

3.5.3 Methodology

This chapter draws on the results of a two-year research project we are currently conducting for the Water Research Commission, entitled *Lessons Learnt from the Establishment of Catchment Management Agencies* (K5/2320). The research team has been working with the CMAs and in their respective water management areas for a number of years. Thus, the results presented here are drawn not only from the current investigation and conversations, but also from past experience and data gathered for other research endeavours (e.g. Meissner and Funke, 2014; Stuart-Hill and Schulze, 2015). The approach we followed for the *Lessons Learnt* project was to conduct face-to-face structured interviews with various stakeholders or role players involved in the establishment process or those that had been part of the process in the past. To date we have conducted interviews with 27 individuals, attended three stakeholder meetings in the Breede-Gouritz and the Inkomati-Usutu CMAs[7], as well as an interview with a representative of the *Flussgebietsgemeinschaft Elbe* (FGG Elbe) in Magdeburg, Germany.[8] We conducted this interview to investigate the process followed by a developed country in establishing a river basin organisation. The inclusion of the FGG Elbe interview may seem ad hoc; however, the comparison with FGG Elbe identifies the similarities and differences in the experience of establishing a river basin organisation

[7] These CMAs were previously called the Breede-Overberg Catchment Management Agency and the Inkomati Catchment Management Agency. Their names have now changed and we will refer to them by their new names throughout the text, unless we are looking at a significant process before their renaming.
[8] In July 2015 the lead author travelled to Hamburg, Germany for a month long research visit to investigate water security in Hamburg. This visit afforded the lead author the opportunity to visit the FGG Elbe, since Hamburg is a harbour city situated on the banks of the Elbe River.

elsewhere in the world. There are important ontological differences between the South African CMAs and the FGG Elbe that could enable decision-makers in both realities to learn from one another's experiences. Some observers might be tempted to argue against the inclusion of the FGG Elbe in that we are comparing "apples with oranges", so to speak. Nevertheless, as pointed out by Lijphart (1971), John Stuart-Mill developed a method of comparing differences. In this case, we used deliberate randomisation to select the cases we would like to compare, namely the South African CMAs with the FGG Elbe, in that the river basin organisations are alike "…with a very high degree of probability, but not with absolute certainty" (Lijphart, 1971: 684) since they are all river basin organisations in different geographical and socio-political settings. The inclusion of the information gathered during the interview with the FGG Elbe representative is not an end in itself, but an aid in the comparative method (Lijphart, 1971) we are utilising to investigate the practical considerations in establishing CMAs in South Africa. Our argument is that this could provide a better understanding of the establishment of a river basin organisation in other parts of the world. The intention of the FGG Elbe interview was not to identify so-called best practices, but to gain a deeper understanding of motivations and context in establishing river basin organisations.

For the face-to-face interviews in South Africa, not only did we target individuals from the two existing CMAs, we also conducted interviews with government officials that are closely involved in the establishment of the remaining seven CMAs in South Africa, most notably, the Vaal CMA and Pongola-Umzimkulu CMA. The latter includes a lived-experience from the current establishment phase through attendance of the steering committee meetings. During the interviews we asked stakeholders to reflect on the establishment process thus far. We also made a number of observations during the three stakeholder meetings. Through these observations we identified a number of processes that were deemed important by the interviewees for consideration in establishing the remaining CMAs. We then grouped the issues identified in the interviews into five categories, namely structures of rule, not including stakeholders, finances and public administration processes, the difference between the main and trading accounts of DWS and the management of stakeholder relations. Before discussing these practices, we will give a rendition, by way of a historical account, of the CMA establishment process to date.

3.5.4 The CMA establishment process

South Africa's CMAs were established in terms of section 78(1) of the National Water Act (Act No. 36 of 1998) (RSA, 1998). One of the main principles of the National Water Act is its focus on decentralisation. Decentralisation places an emphasis on public participation in water management and related decision-making processes. Decentralisation also rests on the subsidiary principle, which is encapsulated in the South African Constitution (RSA,

1996). Subsidiarity means that those functions that can be more effectively and efficiently carried out by lower levels of government should be delegated to the lowest appropriate level (Funke *et al*., 2007; Meissner and Funke, 2014). In this regard, the National Water Act and the Constitution are two structures of rule that are constitutive in the establishment of CMAs. Nevertheless, they are not the only causal mechanisms in establishing CMAs.

In October 1999 the government of South Africa established 19 water management areas (WMAs). The boundaries of these areas are along catchment divides and do not coincide with the administrative boundaries defined by local and provincial government. At that time, government contemplated the establishment of 19 CMAs (Meissner and Funke, 2014); one in each WMA. Since the promulgation of the National Water Act in 1998, the implementation of the legislation has been slow and problematic (Funke *et al*., 2007; Meissner and Funke, 2014). These implementation problems also translated in the slow implementation of the envisaged 19 CMAs (Hattingh *et al*., 2004; Meissner and Funke, 2014), with only two CMAs implemented to date, namely the Breede-Gouritz and the *Inkomati-Usutu* CMAs. In 2012, the Department of Water and Sanitation (DWS) decided to reduce the 19 planned CMAs to nine; the Minister approved the establishment of *nine CMAs* in the newly delineated *nine* WMAs. This move was due to a reconsideration of the management model and viability assessments related to water resource management, funding, capacity, skills and expertise in regulation and oversight. The decision was also an effort to improve integrated water resource management. The nine CMAs are Limpopo, Olifants (Mpumalanga Province), Inkomati-Usutu, Pongola-Umzimkulu, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz and Berg-Olifants (Western Cape) (DWA, 2013). Currently, and apart from the Breede-Gouritz and Inkomati-Usutu CMAs, the remaining seven CMAs are considered so-called proto-CMAs since they are in the process of being established; those proto-CMAs are managed by the respective regional offices of the DWS.

Thus, prior to the establishment of the Breede-Gouritz and Inkomati-Usutu CMAs, management of the water resources of the two catchments was the responsibility of the DWS regional offices in the Western Cape and Mpumalanga Provinces, respectively. Water management took place through the water management area's internal strategic perspective (DWAF, 2004a). In the case of the FGG Elbe, it was established to coordinate the implementation of the European Union's Water Framework Directive of 2000 and the Floods Directive of 2007 for Germany's federal states sharing the Elbe River basin. Prior to the establishment of the FGG Elbe, the German federal states sharing the Elbe River managed it in terms of Germany's national legislative framework.[9]

[9] Personal communication, Groundwater Expert, FGG Elbe, 10 July 2015.

The CMAs will perform certain water management functions and are required to cooperate and seek agreement on water-related matters amongst various stakeholders and interested parties. In essence, CMAs are service-delivery agencies and are listed in the Public Finance Management Act, 1999 (Act 1 of 1999). The CMAs are also linked to Treasury Regulations to ensure financial viability and good governance (DWA, 2012). Catchment management agencies also have a mandate to develop a catchment management strategy. This strategy is a plan to "realise the protection, use, development, conservation, management and control of water resources in [a CMA's] respective WMA" (Meissner and Funke, 2014:185; DWAF, 2004; Funke *et al*., 2007). The catchment management strategy therefore gives effect to the role and functions of a CMA. Various stakeholders were involved in the establishment of both the above-mentioned South African CMAs and followed a negotiation process guided by the regional offices of the Department of Water and Sanitation (DWS)[10] (McConkey *et al*., 2005). In case of the Breede-Gouritz and Inkomati-Usuthu CMAs, a reference group was established, consisting of representatives from various sectors, such as agriculture, local government, emerging farmers and the tourism industry. The DWS was the most notable stakeholder assisted by private consultants[11] (Meissner and Funke, 2014). These consultants assisted in the preparation of discussion documents, facilitation of meetings, and focused on the interaction with role-players around concerns and suggestions of stakeholders in their specific regions (MBB Consulting, 2001). In the case of the FGG Elbe, 10 German federal states were involved in its establishment. These federal states all share the Elbe River basin. Germany's Federal Ministry of the Environment was also involved in the establishment process. There is a similarity between the CMA's catchment management strategies and the FGG Elbe river basin management plan, in that in both cases the organisations had to develop their own river basin management plans.[12]

The original impetus for the establishment of the FGG Elbe was government or supra-national (European Union) structures of rule or two European Union Directives. It would appear that in the South African cases, the process, after government direction, viz. South Africa's National Water Act, was more decentralised with the involvement of various stakeholders from society and government. This was in line with the decentralisation vision set by the South African Government in the post-1994 political dispensation, which favoured more involvement of organisations at grassroots level as opposed to the command-and-control vision of pre-1994 governments. From this discussion on the history of the CMAs and the FGG Elbe's establishment process, it is clear that governments or supra-governmental entities drove the process. When observing the

[10] Between 1994 and 2009 this department was known as the Department of Water Affairs and Forestry (DWAF) and between 2009 and May 2014 as the Department of Water Affairs (DWA). It is currently referred to as the Department of Water and Sanitation (Meissner and Funke, 2014).
[11] Personal communication, Associate Director, Pegasys Consulting, 12 September 2012.
[12] Personal communication, Groundwater Expert, FGG Elbe, 10 July 2015.

history of CMA establishment from a macro-perspective (i.e. a process conducted and directed by government), hidden causal mechanisms at play can easily be ignored by observers. These hidden variables came to the fore during the interviews we conducted with the various stakeholders in South Africa and to a certain extent in Germany. The next section reports on these practices at play.

3.5.5 Stakeholders' discernible practices

Alluding to the brief description of the river basin organisations' establishment process, we can identify a number of practices. The first of these practices relates to the structures of rule mentioned above. The National Water Act is central to the CMAs in that it gives the Minister of Water and Sanitation a strong influence to appoint the CMA's governing board. The governing board is to be representative of all stakeholders within the WMA. Even so, the CMAs are at the same time quite autonomous and have mechanisms of democratic control, e.g. the establishment of relationships with similar organisations in other countries. The required catchment management strategy (CMS) for each WMA and CMA also sets principles for water allocation and considers issues related to water resource protection, use, development, conservation, management and control. In the case of South Africa, these measures must be in line with the National Water Resource Strategy (Meissner and Funke, 2014). However, a CMS is yet to be drafted for either of the established CMAs. This is largely due to the incorporation of other WMAs with the current CMAs.[13][14] For instance, the Breede-Overberg WMA had been amalgamated with the Gouritz WMA. In the case of the Gouritz CMA, establishment of the CMA was put on hold until the amalgamation of the WMAs was completed. When the FGG Elbe implemented the Water Framework Directive, significant water management issues had been derived by the federal states at a river basin level such as river continuity, nutrient loads and chemical pollution, pollution from old industrial areas in the former German Democratic Republic (GDR), climate change and geomorphology in the river basin. These issues make the management of the Elbe River a constant challenge. The representative from the FGG Elbe indicated that all these issues are a continuous challenge.[15] This is something that South Africa's CMAs should expect when their strategies are implemented even when they are well established and functioning; everything will be constant challenge because of economic pressures and the CMAs that will have to manage a complex natural resource system with the aim of socio-economic development.

Secondly, when it comes to the involvement of various stakeholders, the results of previous research studies conducted on the Breede-Overberg CMA indicated that it is not

[13] Personal communication, Board Secretary, Inkomati-Usuthu Catchment Management Agency, 23 June 2015.
[14] Personal communication, CEO, Breede-Gouritz Catchment Management Agency, 24 August 2015.
[15] Personal communication, Groundwater Expert, FGG Elbe, 10 July 2015.

always feasible to include all stakeholders in a water management area in the development of the CMS. This is one of the major hidden variables in the establishment of the CMA. The sheer number of people that want to attend meetings can draw out the process unnecessarily and make it time-consuming[16] (Meissner and Funke, 2014). The same applies to the Inkomati-Usutu CMA, where a series of five stakeholder meetings and workshops were held by the CMA over the period of a year (2010) specifically around the development of a CMS (Nyakane-Maluka and Jackson, 2010). This had a direct impact on the financial and human resource costs of establishing the agency. The question of involving a large number of stakeholders was an issue that also came up during interviews at the FGG Elbe. In this case, the official explained that due to the involvement of 10 different federal governments, different economic and political interests and aims in the management of the Elbe River came to the fore and had to be negotiated. They also had different structures of rule influencing, for instance, the monitoring of river health. This can lead to a long and time-consuming process to reach agreement on certain issues. [17]

In terms of financial and human resources, establishing a CMA can be a demanding and taxing process from a public administrative perspective. This is the third practice that has emerged from the interviews. Regarding human resources, for instance, the process can require a large number of consultations with employees from the government department that need to be transferred to the CMA once it has been established. One issue that needs consideration is that the offices of the CMA might not be situated near the regional or national offices of the DWS. This means that employees that had been travelling to the regional and/or national office(s) now might need to relocate to a different town so they can be closer to their place of employment. This is the case with the Vaal proto-CMA currently being established, which might be situated near Rand Water's head office to the south of Johannesburg. To transfer employees from the DWS offices in Pretoria will further involve labour relations matters.[18] Some employees might feel that they do not want to be transferred because of personal reasons. This will involve the negotiation of transfer policies not only at individual level but labour unions also need to be involved. It is likely that this may lead to resistance from employees and low morale because they are uncertain about the implications of such human resource practices. This process therefore needs careful management and in a thoroughly transparent manner.

On a separate note, transfer agreements will involve matters such as employees' pension funds, medical aid, salaries and salary levels, systems for salary payments, labour union representation, leave management and so on. In addition to the administrative processes involved regarding human resources, employees' perceptions around uncertainties

[16] Personal communication, Associate Director, Pegasys Consulting, 12 September 2012.
[17] Personal communication, Groundwater expert, FGG Elbe, 10 July 2015.
[18] Personal communication, DWS regional office Johannesburg, Department of Water and Sanitation, 10 June 2015.

regarding employment security must also be taken into account.[19] Change management therefore becomes an important process in the establishment of a CMA.

Fourthly, the difference between a trading entity and the main account of the DWS needs to be considered. This is a distinctly South African matter. A trading entity is funded from water users that pay for the water they consume, like irrigation boards. Department staff members of such trading entities are paid salaries from the trading account. The main account is the funding or budget that the DWS receives from the National Treasury of South Africa. The challenge with this difference is that corporate management of the DWS, excluding finance, has been servicing both accounts and the accounts of the staff members that might be transferred had also been serviced from both accounts. One way of getting around this administrative issue is by seconding people to the CMA once it has been established; that will give added support to the CMA when it is operating sustainably. Another challenge is that hydrometry services might also move to the CMA from the main to the trading account. This will also be the case for water use and regulation where budgets need to be transferred in the same way. The issue with this is that the functions of these units are linked to the type of account and moving the units will have human resource implications. For instance, service level agreements need to be in place between the CMA and the regional and national offices so that the services to be supplied by the DWS and/or CMA need to be well defined and stipulated.[20]

Effective management of stakeholder relations is another important component of CMAs and this is the fifth practice identified by the authors. We also observed this practice when interviewing the representative of the FGG Elbe. For the FGG Elbe, stakeholder relations are not only an important communication endeavour (e.g. keeping stakeholders abreast of what is happening in the river basin and flood warning), but also necessary in the daily functions like river health monitoring.[21] We argue that without good stakeholder relations, decentralisation cannot be adequately achieved since decentralisation involves the interface (communication) between authorities and stakeholders at grassroots level. In this regard, both established CMAs have relatively close and remarkably good relationships with stakeholders. These relationships, as with any relationship, had to be built from the onset. For instance, initially, stakeholders were reluctant to engage with the Breede-Gouritz CMA owing largely to challenging experiences with the regional/national DWS offices. For instance, some individuals in stakeholder groupings have been waiting on DWS for numerous years with regards to licensing applications.[22] In this regard, stakeholders wanted to know whether the CMA would be any different from the way in

[19] Personal communication, DWS regional office Johannesburg, Department of Water and Sanitation, 10 June 2015.
[20] Personal communication, DWS regional office Johannesburg, Department of Water and Sanitation, 10 June 2015.
[21] Personal communication, Groundwater expert, FGG Elbe, 10 July 2015.
[22] Attendance of a Stakeholder meeting with the Breede-Gouritz Catchment Management Agency staff, 20 August 2015.

which DWS carries out water-related activities and tasks. In other words, there is an expectation from stakeholders that the CMA will, in certain instances, do a “better job” than the DWS. The onus was on CMA staff attending the meeting to persuade the stakeholders, firstly, to participate in stakeholder meetings and explain the benefits of these meetings, and secondly to give members the assurance that the past is the past and that the CMA would have other options at hand to assist stakeholders with their needs.[23]

3.5.6 Conclusion and recommendations

The establishment of a CMA does not happen overnight. There are a number of issues that need to be considered by the policy makers and stakeholders involved in the establishment process. Structures of rule are important constitutive aspects in the establishment of a river basin organisation. We have seen this in the case of South Africa’s CMAs and the FGG Elbe. Nevertheless, structures of rule are not enough. There are other variables also at play in the establishment of river basin organisations and their subsequent governance. Variables that are important in this regard are the involvement of stakeholders during the pre-establishment phase and stakeholder relations after establishment. These are important aspects which require careful management in order for the CMAs to achieve their objectives of decentralised, participatory, sustainable water resources management.

The sheer number of stakeholders during the pre-establishment phase was an issue not only for South Africa’s CMAs, but also for the FGG Elbe. It became a complex affair in both cases because stakeholders bring with them their own issues, perceptions, expectations and interests. With regards to the financial aspects of CMAs’ operations, there are no issues currently, but for future development of the CMA this may be a constraint. The DWS should continue to provide financial support to the CMA even after the CMA starts receiving water tariffs. This would not only highlight the support of the DWS behind a decentralised approach to water resource management but will also enhance staff morale and give the CMA the ability to carry out an even wider range of tasks in developing water resources sustainably. What is also needed is participatory management as well as implementing the vision of equity in water resources management and the achievement of water security, which would further enable the CMA to play its role as catchment steward. The DWS could also consider phasing out such financial support; at this stage it is impossible to reach a definite conclusion as to what the results of this action might be, since there is no past experience of this in South Africa. It would therefore be premature to say that it could jeopardise the financial viability of the CMAs.

[23] Attendance of a Stakeholder meeting with the Breede-Gouritz Catchment Management Agency staff, 20 August 2015.

Currently, stakeholder relations between the CMA and members within the WMA are relatively good in the two CMAs that are currently established and fully operational in South Africa. This is also the case with the FGG Elbe where they keep stakeholders abreast on current affairs in the Elbe River basin. It would appear as if the CMAs and the FGG Elbe have put a high premium on stakeholder relations. This is something that will stand these organisations in good stead for their future governance endeavours. However, in the case of CMAs, there is room for improvement when it comes to perceptions regarding the involvement of DWS in the establishment process. Trustworthy and constructive stakeholder relationships are central to the effective and efficient management of water resources and to an extent the success of CMAs. From current observations of several stakeholder meetings, it was observed that DWS officials often arrive late for these meetings and failed to cater to the needs of attendees at these meetings, therefore adding to the negative perceptions of the DWS. What is more, language can be a barrier since people, especially in the rural areas are more comfortable getting and delivering messages in their native language. This is something the CMAs also need to consider.

Furthermore, currently the CMAs have an adequate staff complement. Nevertheless, adequate does not mean that there are no shortages. Certain areas, such as water quality monitoring, requires sufficient technical staff. This seems to be an issue at the Inkomati-Usutu CMA as they outsource the testing of their water samples. Sample testing has a very long turnaround time due to issues with the laboratory. If the CMA had its own functioning laboratory, test results would be obtained a lot faster and more water samples could be tested. However, the establishment and operation of a laboratory has its own logistical challenges, one, which is accreditation from applicable regulatory bodies like the South African National Accreditation System (SANAS); these factors should be carefully considered before making a decision regarding an independent laboratory.

Within the establishment phase of CMAs, DWS could provide more resources and guidelines with regards to the initial functions of CMAs. This could enable the CMAs to begin operations fully understanding their roles and responsibilities. A comprehensive list of initial functions, including processes and tools, beyond what is mentioned in the National Water Act of 1998 and possibly in the National Water Resource Strategy (DWA, 2013), needs to be produced so that staff has an understanding and adequate guidance as to what is required of them. It would be advisable to include a staff member with a legislative background in the establishment and operational process. In order for the CMA to provide adequate monitoring and enforcement, individuals with an understanding of environmental laws should be included as the CMA receives its full delegation. This was lacking with regards to the Inkomati CMA as well as the Breede-Overberg CMA (Pers. comm. J. Boshoff, 23 June 2015). The establishment of a proto-CMA within DWS regional

offices may be a good option. This would allow the CMA to “hit the ground running” as opposed to taking time to find its feet. However, this also has the risk of “copying and pasting” activities and decision-making process from the regional DWS office. As alluded to above this is not adequate to fulfil functions and establish relationships with stakeholders.

A clear direction between national strategic initiatives, structures of rule and the management of the river basin at WMA and basin levels assists policy makers involved in the establishment process on what needs to be done and gives a clear direction on how to initiate the process. This includes clarity on functions, roles and responsibilities. There seems to be very little space for ambiguity, and uncertainty has a significant impact on the success of the establishment phase, which can carry through into the operational phase. Not only is there uncertainty during the establishment phase. In the case of the FGG Elbe the representative said that they are constantly being challenged by issues such as pollution and nutrient loads. This is likely to also be the case with South Africa’s CMAs since they are also, like the FGG Elbe, managing a complex natural resource with multiple stakeholders.

Moreover, officials need to plan the establishment process very carefully, especially regarding the allocation of financial and human resources. Careful planning could enable policy makers to ascertain where to draw the line when involving a certain number of stakeholders and can assist them in striking a balance between involving too few or too many stakeholders. With regards to financial resources, both CMAs currently receive sufficient funding from DWS. However, as the CMAs have now become large spatial units with numerous catchments and sub-catchments, with further delegations, the allocation of financial resources may become an issue in the future. Also, it is envisaged that CMAs will become self-sufficient, thereby attaining funds through receiving tariffs paid by water users. This could prove to be a major financial constraint as the CMA would receive approximately 70% of its expected budget through these tariffs. There are still questions with regards to the remaining 30%.[24] Planning the financial viability and security of the CMA becomes a key variable here and sufficient finances need to be allocated to enable the CMAs to ensure their ability to be responsive to the administrative and stakeholder demands.

Regarding human resource processes, it is recommended that labour unions are involved from the outset so that uncertainties can be minimised and employees take ownership of their transfers. Another issue with regards to the employment of staff is that there is no task-specific training of individuals. All conversations, interviews and engagements have

[24] Personal communication, Senior Manager Water Resources, Breede-Gouritz Catchment Management Agency, 25 August 2015.

shown that the CMA environment requires a different set of skills compared to the known job profiles of regional or the national DWS officials. This means that the majority of the tasks carried out by the CMA require staff to learn as they grow within the CMA environment.[25] [26] Such learning needs an adaptive, responsive organisational set-up, and a leadership that trusts its employees and vice versa. It is not our intention to impose adaptive management principles on the organisation. However, it should be clearly stated that the learning environment of the organisation should not be restricted to a set of law-like principles; the organisation's leadership needs to decide how it will apply learning practices. Should adaptive management principles be imposed on an organisation, it would mean that command and control had moved from an old centralised government authority to an unaccountable and centralised 'epistemic authority'. The employees should be given the space and possible training to enable engagement and learning in a continuous and inclusive manner.

What is more, future CMAs would have to take note of stakeholder expectations and those expectations should be partially defining in establishing a relationship between the CMAs and its stakeholders. These issues or practices might not be major constraints but influence the operations of a CMA and thus its successes significantly.

Policy makers should also bear in mind that the establishment process is not only about pitfalls and challenges. There are also opportunities to take advantage of. One such opportunity is the knowledge of public administrative processes held by DWS officials. Such knowledge can be a defining resource between a successful and stalled establishment process. In this regard, the knowledge of public administrators should not be viewed by stakeholders, scientists included, as another burden on the establishment process. Scientists have a tendency to not include public administration processes in their research endeavours when analysing CMAs. They would rather look at the streamlining of the establishment process, technical skills and possibly political issues. The identified practices and conclusions drawn should therefore not be seen as a set of recommendations for policy makers and stakeholders involved in CMA establishment processes only, but also for scientists researching the process. Scientists are, after all, also stakeholders when they research CMAs and may also be involved in some of the CMAs currently being established. The research has shown a strong link between the successes or challenges of the establishment process and the way in which CMAs operate. This is an area where further research is needed as the process of establishing the other seven CMAs progresses.

[25] Personal communication, Board Secretary, Inkomati-Usuthu Catchment Management Agency, 23 June 2015.
[26] Personal communication, CEO, Breede-Gouritz Catchment Management Agency, 24 August 2015.

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CHAPTER 4: PERCEPTIONS AND FEEDBACK FROM STAKEHOLDERS AND DECISION-MAKERS

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Two Honours projects of 2015 focussed on the inter- and intra-organisational operations of the two existing CMAs. One of them looked at inter-organisational knowledge management in order to gain insight into information sharing, knowledge creation and decision-making processes (*cf.* Section 4.1). The other project investigated the specific relationships of the organisation to industry and commercial activities in the catchments (*cf.* Section 4.2). This latter has been specifically chosen due to most of stakeholder investigations being based on South Africa's legacy of the apartheid and poverty resulting in a main focus on rural and disadvantaged communities. Thus, the second Honours projects is trying to close the gap here by reflecting on private industry and its involvement in/contributions to water resources management.

Furthermore, transcribed interviews with the CMAs operational staff, and expert interviews from 2010, interviews (also transcribed) conducted in the course of this research project and a workshop held end of 2015 have been reflected upon through a specifically designed analysis approach (*cf.* Section 4.3).

4.1 Inter-organisational Knowledge Management

The transformation of water management approaches has resulted from a major paradigm shift in water management (Gleick, 2000; Clark and Smithers, 2006; Ison *et al.*, 2011, Horlemann and Dombrowsky, 2012). If previously accepted views of water management have had to change, perhaps the associated information management as to change accordingly (Harris *et al.*, 2001), or the range of the components of the environment, the data of which is required, is becoming wider (Schulze *et al.*, 2004). There is a necessity to use data, which has reliable long-term records to simulate reasonably reliable forecasts (Abbot and Refsgaard, 1996), even if they were used by a central system. So, does that mean data and information used prior to the management change and paradigm shift respectively become of little value, relevance or out-dated? Which also leads to the questions: Does information utilisation differ with the

decentralisation of water management from the way it is in a central structure? Similarly, there needs to be the same questions asked for hydrological models utilised for planning and management. Hydrological models are tools that go beyond what monitored and observed data is available. Still, the observed data is used together with hydrological knowledge to yield required results (Abbot and Refsgaard, 1996). Both, hydrological information and models, are mainly used in water resources management to guide and influence decision-making. However, the currently aimed for holistic water resources management practices require models that integrate the different aspects of the catchment environment or an integration of different models, accordingly so (Clark and Smithers, 2006).

Therefore, hydrological information, models and participatory processes that are used currently in the two operational CMAs were investigated through a desktop study of government documentation and literature on the one hand, and complementally open-ended interviews with CMA officials on the other. As alluded to earlier it has become apparent that the “new” structure of water management institutions is associated with a requirement for new types of data (Lemos *et al.*, 2010). DWS is responsible for data and information acquisition, monitoring, management and distribution; communicating information and data amongst different organisations independent from DWS (Harris *et al.*, 2001). Thus, the data types assessed in this project have been divided into three types, these being conventional data, hydrological modelling and local knowledge. Numerous interviews and review of documentation by the CMAs have enabled good insight into the current operational mode of both CMAs. The results are described and discussed in the following sections, *cf.* 4.1.1-4.1.3.

4.1.1 Conventional data used

CMAs use hydrological data records for rainfall, reservoir volumes, water quality and flow gauge readings taken at different monitoring points in their respective WMAs. Furthermore, hydrological information is used to inform decisions in relation to water licensing, licensing streamflow reduction activity in the catchments, the drawing up of a CMS, water allocations, protection of wetlands, and industrial effluent regulation. Information on invasive alien vegetation, particularly in riparian zones of river tributaries in the Breede-Gouritz WMA is used by BGCMA. The CMA also has an initiative pending where monthly groundwater levels are to be monitored throughout the WMA; private consultation is being utilised to get assistance on assessing and designing this initiative due to the lack of capacity within the CMA on this topic/skills/human resources.

The custodian of hydrological information used for water resources management in South African CMAs is the national DWS. It is responsible for the collection, monitoring and

storage of hydrological information for the entire country. Rainfall information is made available for the sites that are monitored by DWS, but DWS does not collect the data. Rainfall information is collected by the South African Weather Services (SAWS). CMAs do not only use information from DWS and SAWS respectively, but include information gained from other organisations as well. An example is the case of the IUCMA that uses data collected independently by itself, from the South African Sugarcane Research Institute (SASRI) as well as from SAWS. When introducing the MAIS functional model (see Annex 3 for details), it was mentioned that one of the gaps that needed to be bridged was having more than one organisation monitoring weather and hydrological processes (Harris *et al*., 2001). It is important that, instead of wasting space and resources probably monitoring the same variables, organisations should exchange their data. It can be seen that this is being achieved with information being made available not only by DWS, but by SASRI and SAWS as well.

DWS makes these hydrological data available for the general public by placing them in its website, www.dwa.gov.za. Hydrological data are made available from monitoring sites that are managed by DWS in the form of surface flow, dam storage capacity, dam water levels, peak flows, flow management, borehole and rainfall data. For information that is unavailable, there are links that lead the user to sites where the information is available. As the DWS, IUCMA also makes its hydrological information available to the general society from its website, www.inkomati.co.za.

4.1.2 Hydrological modelling

IUCMA makes use of models for water yield, which are made available to the CMA by DWS, while BGCMA uses no models so far. Under circumstances where the CMAs do not have enough information to make decisions, water licensing and allocations are examples of these, they consult with relevant specialists/consultants. Both CMAs do this when necessary. It is the consultants and service providers respectively whose services are used that run models for the results and information required.

Other information used by CMAs is on an ad hoc basis and depends on what the CMA is looking for; what decision they need to make. Practical examples would include the demographics of the society in the WMA, before creating a Catchment Management Strategy (CMS), in order for CMA officials to prepare informing people in a way that is understandable and makes sense to them.

4.1.3 Qualitative data from participation

Local governments, Water User Associations (WUAs), commercial farmers, subsistence farmers, schools and civil society (will be referred to as 'the public' from here on) are the groups of people who are invited to participate in the management of water resources within the WMA managed by a particular CMA, but more especially in awareness.

Capacity building in forms of teaching the public how to monitor water quality, promotion of the water week and mini-SASS (Stream Assessment Scoring System) are some of the ways of getting the civil society not only involved in decision-making but in the hands-on management and monitoring of their own resources. This is particularly true for the BGCMA.

Both CMAs, BGCMA and IUCMA, have committees, campaigns, forums, school programs and seminars to educate the general public about the hydrological state of their catchment and rivers respectively, in order to help the public understand the need to treat the environment in certain ways and to introduce certain perspectives into the society, such as letting them know that South Africa is in fact a water scarce country and managing the demand of water resources is important (Herrfahrdt-Pähle, 2010). Hydrological information on the Internet may be freely available, but it is not necessarily accessible to everyone. People in communities in the different WMAs are not all trained to understand what the information means. Some people do not even use the Internet (Bradbury, 2009). Why is it important that the civil society understands this information, or more importantly, the knowledge that is created from it? The society is after all supposed to help the CMA manage its water resources and getting the society involved in many aspects of the management process is crucial. People are invited to join forums and meetings through newspapers, word of mouth, emails, flyers and through the Internet (the websites), including the newsletters that each of the subject CMAs have. Meeting minutes are made available to the different groups of people involved. The meeting notes include the inputs made by the civil society. Information that would be relevant to expand this study, however, is a quantification of whether the campaigns conducted in schools and the general community are having an influence in the curbing of water demands from the public.

Before the CMS is finalised people are allowed to object or add certain aspects based on the approach of co-management. Questionnaires are handed out to assess the responses that people have. These are also made available in the Internet for people to fill in and return to the CMAs. This is how CMAs try to maximise the input from stakeholders.

However, there are also circumstances where the CMA makes decisions independent of the society. The issuing of water licenses requires information that can be acquired and processed by private consultants and based on water yield and possible effects to the environment the knowledge produced guides the decision to be made regarding the licensing, and the conditions under which the license is issued. It has become clear from the interviews, etc. that the CMAs involve the public based on the type of decisions that need to be made. Certain decisions are perceived to be relevant only to officials and the water license applicants or candidates involved. Should an issue stay unresolved after all the means of public consultation, BGCMA makes the decision on behalf of them.

The development of the CMS is the one decision process that certainly requires public participation so that everything else that is done by the CMA is done in a manner that was agreed upon in the CMS. However, information acquired and used is not always shared with the general public.

Much of the information management and public participation systems that are documented for a successful application of NWA and IWRM are being used, although often, public participation is used more for management engagement and not all decisions that have to be made. The quality of data and information used for the decision-making can always be improved, because the dynamics of society and the economy create continuous uncertainties as alluded to earlier. A CMA is in a better position than state officials who work from either a larger regional office or in Pretoria, to monitor certain aspects of water resources. This is so because of their closeness to the stakeholders in the catchment, to the actual monitoring points and to the overall dynamics of change, be they biophysical, societal, political or economic. This is why the BGCMA as part of their capacity building initiative are using simple ways of assessing and monitoring river health and water quality.

4.1.4 Conclusions

Most hydrological information used by CMAs is of a first order nature as classified by Schulze *et al*. (2007), being rainfall, streamflow, water quality, hydrological water yield and reservoir storage levels. Much of this information is mainly monitored and made available by DWS national, with some information supplied by SAWS and SASRI. DWS is the legal custodian of hydrological information used by CMAs. CMAs are, however starting to manage information for them. Hydrological models supplied by DWS are used only by IUCMA for water yield, with BGCMA not using any yet.

The general information flow observed is from the CMAs directed to the public. The public only informs decisions through the feedback of perceptions. Thus, public participation

could be improved to not just awareness and education (knowledge sharing), but to make decisions as well. This could initially be done as an experiment to see how effectively decisions can be made, which will affect everyone.

There are two underlying needs based on the conclusions above, which are beyond the scope of this study. On the one hand there is the need to identify whether consultation with specialists is sufficient for making 'good' decisions or if the CMAs need to run models themselves, particularly in reference to the BGCMA practices. This can be done for transparency and a full understanding of how certain decisions were reached. On the other hand, there is also a need to assess if the involvement of the public in the management and monitoring of water resources, as done by CMAs, does lead to 'better' management in order to identify what works and what does not. 'Better' management could here be reflected by the reduction of water user demands or improved water quality for example.

4.2 Intra-organisational Initiatives on Water Quality and Water Provisioning: CSR Initiatives as an Example

South Africa's water supplies are quickly approaching their threshold as the demand for resources exceeds the resources available. Water conservation strategies need to be intensified and all stakeholders need to get involved in mitigating the water crisis including firms. The topic, which will be investigated in this Section and research project respectively is the involvement of firms through their corporate social responsibility (CSR) initiatives and in their operational activity, in water quality and provisioning. Firms are one of the largest and most influential water users in a catchment. Also, firms are one of the greatest perpetrators of water-related issues. The involvement of firms in water quality and provisioning could make major positive impacts on water resources; CSR initiatives are an opportunity for this. CSR is the behaviour exhibited by a firm that displays a responsible approach to business and perpetuates a goal beyond its core business with regards to society and the environment. Water footprinting is an example of this, which would be useful for the operations of a firm, as the water footprint gives a good indication of the firm's impact on the water resources.

Case studies were conducted in the Inkomati-Usuthu Water Management Areas (IUWMA) in Mpumalanga and the Breede-Gouritz Water Management Area (BGWMA) in the Western Cape. The data used was sourced from numerous annual CSR reports of different firms across different sectors of the economy. Interviews with staff of the CMAs and reviewing their GIS data were used to inform the understanding around private sector involvement at a catchment level.

4.2.1 Discussion

In reviewing the different CSR reports, it was noticed that a lot of the initiatives were not directly focussed on addressing water issues. This seems inadequate considering that South Africa is a water scarce country and water has been listed as a future constraint to development globally, not just in South Africa. It appears that there is not enough involvement of firms in water quality and provisioning through their CSR initiatives. Fortunately, companies are heading in the right direction. Though the primary focus is still on social and welfare-related issues, they are not completely oblivious to water issues (Senwes Limited, 2014; Sappi Southern Africa; Petrosa, 2014). Involvements currently are for example expecting suppliers to be using sustainable agriculture (SAB, 2012) or exercising good environmental practises (Clover, 2014) or using industrial water instead of potable water (Sappi, 2014). Also, firms are getting more involved in water quality and provisioning through the design of their future business plans (Senwes, 2014; SAB, 2012). However, there is still much room for improvement and more focussed involvement.

According to the literature review one area of improvement is the water footprint. Currently the firms are only accounting for the direct blue water footprint. This value is an underestimation of their real water footprint. If they are not aware of the real volumes of their usage then it will be difficult to know the true extent of their impact on water resources. More accurate water footprints and better recording is needed to make clear for example where wastage is occurring and what areas are available for improvement of water usage. There seems to be no standardised methods for water foot printing in South Africa, and after further research it became evident that even worldwide, there are no formalised or mandatory methods of measuring a firm’s water footprint. Without such a standard method of foot printing, it is problematic to analyse and compare the water usage of one company to another and also to identify wastage. The Water Footprint Network is one of the organisations working towards understanding and establishing water and the water footprint created by an individual, firm or product (SABMiller plc and WWF-UK, 2009).

Another observation was that the CSR reports informed the understanding of firms mostly on a national or regional level. The case studies helped to increase an understanding on a smaller scale. The catchments being investigated are managed by their respective catchment management agencies (CMAs). These manage the water resources in a catchment and deal with the challenging task of managing the demand of water in a catchment to the supply and ensuring the health of water resources (Boshoff, 2015) and by that the well-being of the people and functioning of the economy.

Employees of the CMAs are the managers of water in a catchment and therefore it was deduced best to interview them as they have the most detailed knowledge and diverse interactions with firms under investigation. It was assumed that they would know the impact that firms have on the water resources. It has to be clarified that the two Water Management Areas of the case studies, *viz.* BGWMA and the IUWMA, are located in two different biomes and climatic zones of South Africa. This could affect the water footprints of firms in the catchments (SABMiller plc and WWF-UK, 2009). As mentioned in the literature review by Jersion (1968), the warmer area will have a greater green water footprint due to increased evapotranspiration and therefore increased water demand by agriculture. The IUWMA has a higher mean annual temperature than the BGWMA, also the IUWMA has a greater evapotranspiration. It can therefore be assumed that the green water footprint will be higher in IUWMA than in the BGWMA even if the crops grown are identical or similar. The IUWMA has an added advantage of water availability during the summer months, their growing season whilst during the BGWMA has little water in their growing season. This reduces the need for water abstraction in the IUWMA and reduces their blue water footprint. But the season results in the increase of the green water footprint during those summer months so the total water footprint does not change as the reduction of the blue water footprint is replaced by the increase in the green water footprint. Also, water transfer schemes have been used as an option to mitigate supply so the blue water footprint does not change that much.

During the interviews, it was unpacked that on a catchment level, firms were not alone the greatest polluters to water in the catchment but it was also the municipality (Boshoff, 2015). In the IUCMA the municipality polluted more than the firms (Boshoff, 2015). Most firms in the IUCMA sourced their water from the municipality and returned their waste waters back to them. (Buthelezi, 2015; Boshoff, 2015) Therefore, there is little room for firms to pollute the water (Buthelezi, 2015; Boshoff, 2015). Though firms still had a few incidences of pollution like with mining, the municipality generally pollutes more (Boshoff, 2015). The IUCMAs felt that the current sewage plants were under capacitated to do the work that is currently needed (Boshoff, 2015). A number of interventions are needed to solve this problem and appropriate financial resources. In the BGWMA, due to the international standards that firms needed to adhere to when exporting raw materials, firms do not pollute much (Buthelezi, 2015). International standards bind them to produce their products and services with the efficient use of water and good environmental practises (Buthelezi, 2015).

With regard to CSR initiatives, employees from both CMAs admitted that not much was being done by the firms that were geared towards water quality and provisioning. In the IUWMA, a partnership with Sappi exists, which includes a few educational programmes in the local schools and villages on water (Boshoff, 2015). In the BGWMA, collaboration

exists with the WWF and Woolworths; they are running a stewardship programme in the catchment (Buthelezi, 2015). No other examples were given during the interviews.

Other observations made were that not many companies of the 500 best-managed companies in South Africa (Krige, 2015) release CSR or sustainability reports or published annual or annual integrated reports. This made it challenging to acquire their water footprint and to find out information about their CSR initiatives. Furthermore, some firms may not release a report every year but may release every 2 or more years. It is possible that though reports are compiled annually, some years may not have been released to the public or may not be available online; this makes specifically comparative research more difficult. Additionally, the methodology used for recording and reporting of the data published in the reports was not often stipulated. This raised the question about where or how the statistics released came about. There is no surety that the figures released are accurate. Also, firms reported well on the importance of looking after the environment and water, but not much information was released about their actual water figures. Issues such as wastewater volumes produced and level of contamination thereof, as well as water volumes released back to the environment, and water volumes reused or recycled, were absent. All this made it difficult to fulfil the aim of quantifying the green, blue and grey water footprints of the firms.

It needs to be noted that throughout the project, there was a general lack in the availability of detailed information around this topic as compared to other scientific studies. This shows that more research needs to be done than was possible in the scope of study of an Honours project in order to gain a better understanding of the role of firms in contributing to managing water resources responsibly and sustainably.

4.2.2 Conclusion

Past are the days where the responsibility of looking after a nation's natural resources was left to the government and NGOs. A collaborative effort is needed including firms to act as catalysts in the current efforts dealing with the current water crisis and improving the country's water situation. Firms indeed impact on water quality and provisioning across all scales, from a catchment level all the way to national scale. Firms use a lot of water and they have been known to be one of the greatest violators of water quality especially in the mining sector. Additionally, firms have the ability to create and encourage change due to their political influence and finances. However, it is possible that some firms are not involved in water quality and provisioning due to them not knowing how to get involved, not because of indifference to the issue.

The aims, objectives and research questions were achieved in the course of this research project, but more detailed data and research is needed to fully accomplish the aims. Due to the level of an Honours project, only a limited degree of complexity and depth/detail could be achieved. The methodology of the project could have been improved by including interviews on firms in order to get their opinion and perspective to the topic.

Based on the research done and results derived a few recommendations can be made to firms in getting involved in water quality and provisioning: Firms could help the municipality to improve their pipes and sewage systems as done by and published by SAB (2012). A firm could, if it is within their financial means, build their own water treatment plants like Astral Foods (2013) did, to help reduce the load on the municipality. A firm could do a project that would help towards amending water supplies in their business and in communities like fog collection infrastructure in relevant areas or sponsoring of Jo-jo tanks for rainwater harvesting or even build a desalinisation plant, if also within financial means, like Exxaro (2014) did for drought periods. They could encourage sustainable agriculture and good environmental practises to their partners and suppliers as many of the listed firms did like SAB (2012), Clover (2014) and Tongaat Hullett (2014). They could sponsor initiatives that work towards amending and restoring water resources like Working for Water which clear alien riparian vegetation. They could sponsor educational programmes on water efficiency and water diseases in communities. This would not only save lives but it will teach people on water conservation (DWA, 2013).

Water will remain a controversial issue due to its impact on people, business and the environment. But the current level of water scarcity with regard to quality and quantity, greater management and conservation efforts are needed to ensure that all those who need water have access to it. Firms due to their economic and political influence and their reputation as one of the polluters and over exploiters of water could, if they got more involved, cover large grounds towards compensating their impacts and overall assisting the country in dealing with its water problems. The future does look promising, as many firms have committed themselves towards creating a more sustainable future. However, it is possible that government and policies may need to intervene more and create a more enabling environment for such activities, e.g. through campaigns, subsidies or similar.

4.3 Analysis of meta-data

To further ascertain lessons learnt in the establishment of South Africa's catchment management agencies, the project team made use of expert interviews from 2010, a workshop specifically held stakeholders and experts to discuss lessons learnt from their lived-experience, as well as a variety of other face-to-face interviews conducted in the course of this research project with relevant stakeholders involved in the establishment

of CMAs in the past and presently. We also attended a number of stakeholder meetings organised by the two established CMAs: the Breede-Gouritz and the Inkomati-Usuthu Catchment Management Agencies (BGCMA and IUCMA). Furthermore, expert conversations and workshops held with and in Proto-CMA areas were included in the analysis to broaden the knowledge and expertise on catchment-based management in South Africa.

Based on the literature and research done so far, and especially based on results established we decided on the following code words, with which we would analyse the interviews and meetings:

- Lessons
- Learning, improve
- Practice
- Implementation
- Historical developments
- Past experience
- Process
- Policy
- Policy development
- Establishment (before and after)
- Successes
- Strengths
- Weaknesses
- Causes
- Stakeholders
- Relationships
- Communication
- Leadership
- Support
- Capacity
- Change
- Management
- Decision-making.

The purpose of identifying these code words was to ascertain to what extent the interviewees and stakeholders covered each of the themes. In other words, we wanted to see how many times the code words appear in the interviews and/or meetings as an important focus area (e.g. Meissner *et al*., 2013). By doing the analysis in this way, we

will be able to see the lessons attached to the code word. Said differently, should a word, like decision-making, appear more often than any of the other code words, it will be an indication that advice and/or recommendations around ‘decision-making’ is an important matter when considering the lessons learnt of establishing CMAs.

In a next step we summarised the key messages of each interview or meeting, its relevance to the topic of CMA establishment and the lessons learnt so far. From the transcriptions, we started distilling key cross-cutting, content-related themes that emerged out of the research. This method is called the cross-sectional code and retrieve method enabling researchers to devise a common system of categories, which are then applied to the entire dataset to search for and find ‘chunks’ of labelled data. This is also a useful approach to make comparisons and connections across data (Spencer *et al*., 2003; Meissner *et al*., 2013). We identified the following cross-cutting themes:

- strengths and weakness,
- policy process,
- learning and improvement,
- historical development and past experience,
- processes and practices,
- pre-and post-establishment and
- causal mechanisms.

The purpose of identifying themes in the transcripts and coding them was to ascertain to what extent the literature covered each of the themes. In other words, to determine how many interviews and meetings the themes appeared in as an important focus area. By organising the data into a structured summary and identifying the key emergent themes coming out of this data set, it was possible to construct a good overview (Meissner *et al*., 2013) of the factors playing a role in the establishment of South Africa’s CMAs and the lessons learnt from these variables. The key aspects and main results are summarised in Table 4.1.

Table 4.1: Analysis with regard to the code words identified and their context

Terms	Where are they found?	In what context?
Stakeholder	DUT meeting (Sabine Stuart-Hill presentation) and interviews transcripts.	Multiple perspectives towards water resources management due to different social and educational experiences or background. Public participation at lowest level possible led by the CMAs. Challenges of involving other stakeholders around the table. Information flow. Lack of skills to develop stakeholder's alignments. Facilitated interactions among stakeholders. According to a representative of one of the established CMAs, 'stakeholders have stated trust in the CMA.' This CMA's 'offices are always open to receive all stakeholders, they can utilise the CMA.' 'Two stakeholder meetings held annually at performance and tariff issues.' He also indicated that there are 'a lot of power issues with stakeholders and among stakeholders. But it is challenging to get industry and municipalities around the table.' Another CMA employee noted that the Department of Water and Sanitation is 'a regular stakeholder' attending meetings. She also said that working with communities and schools and other capacity building 'is more advantageous and creates less uninformed stakeholders.' What also transpired during the interviews with the CMAs is that one CMA indicated that 'Swaziland is part of stakeholder base, including specific river basin organisation and relevant departments, same for Mozambique.' CMA is successfully doing cooperative governance including legislations around NEMA, DMR (Minerals), Agriculture and municipalities → good and easy communication. The information/data gap from before that for the CMA's operations was covered like that. Municipalities are very important stakeholders – trust! Stakeholders saw CMA as an extension of DWS, took 1 year to overcome this perception.' One CMA representative indicated that on the first day of the CMA's existence there was not infrastructure, concept of the CMA and so on. 'Also stakeholders did not know; he had to introduce the actual organisation → branding had to be done as well building, etc.; acceptance was needed, so message as a CEO: "we are not here to compete but to add value; we are here to better understand the needs".
Relationships	Interviews transcription	Water management key concepts relates to stakeholders participation and the relationships between CMAs and DWS. A CMA representative noted the CMA has a 'good relationship also with the regional office of DWS.

Communication	DUT meeting (Brian Ash presentation) and interview transcriptions	Communication is important to be kept open to the municipalities. For better decision-making especially concerning staff transfers. Proper communication is lacking. Different stakeholders working is silos (lack integration). In one of the CMAs there are 6 CMFs that are essentially 'the communications'. An official from this CMA also said that: the CMFs have bi-monthly meetings and 'by-monthly meetings for all of them.' 'Mines are attending on a regular basis, only lower Inkomati more irregular. Municipalities took time to engage, but now it is clear that it is about assisting each other, nowadays a lot of progress and better performance. The plan is to launch a catchment wide forum with delegates from all CMFs before end of 2015. Resources Qualification meetings were included into CMF meetings; regional office of DWS are regular stakeholders attending.' Another official noted that: 'CMA is successfully doing cooperative governance including legislations around NEMA, DMR (Minerals), Agriculture and municipalities → good and easy communication. The information/data gap from before that for the CMA's operations was covered like that. Municipalities are very important stakeholders – trust! Stakeholders saw CMA as an extension of DWS, took 1 year to overcome this perception.' And 2 IBs got transformed to WUAs. Communication was uneasy in the beginning, now it is much better, transparent and trust.' Regarding human resources, a representative from one proto-CMA said that: 'No clear message (one voice) → nightmare for planning. Unions not successfully contacted with regard to Section 197 of Labour Relations Act. One meeting earlier in 2015. No proper communication with employees that were to be transferred; agreement is a draft.' This representative also noted that the transfer of staff between the CMA and DWS could have been communicated much better.
Leadership/support	Interviews transcriptions	The possibilities of success highly depend on support through leadership. In comparison to skills, leadership is more possible, however, leadership requires skills. (Imbalances). Regarding human resources, leadership was highlighted by one of the existing CMA's as very important. Lack of leadership was cited by an interviewee as a barrier of change in South Africa. Another interviewee said that skills and leadership are almost equally important because you 'need leadership to move forward, identify gaps and be more innovative. Managers are not leaders.' For another interviewee, leadership is

		more important especially 'how to lead in high-level decision-making – this is needed on each provincial level. The CMAs 'are performing IWR, leadership in this is needed, but also for economics, business, etc. hence many different skills.' One interviewee said that skills are more important 'as [skills] create confidence which then creates leadership.' On this, this respondent also said that 'affirmative action is undermining the development of skills. Unskilled people are pushed in positions where they are not talented and taken out of pathway where they get hijacked out of leadership pathway.' Another respondent said that 'leadership will evolve out of skill base. It is already happening.' For another respondent there is 50/50 split between skills and leadership. However, he or she said that 'leadership lacking around environmental issues specifically.' Another interviewee said that 'local government is lacking [leadership] hugely…' Other comments about lacking leadership and missing skills: 'political and personal leadership ≠ management.' 'creative, innovative + leadership = growth potential.' 'Skills are more important!' 'Both ways introduced but skills more important at the end. Leadership is fine but lack certain skills.' 'It is both, more skills arising then leadership in South Africa.' 'I am not sure what is meant by lacking leadership but capacity deficits are determinant of the level of achievement possible. In comparison to other African countries, the available capacity is high, but not in comparison with North American or European nation. Pockets of high modern development in South Africa may have difficulty reproducing them and dealing with complex problems such as climate change without comparable levels of capacity and in the face of competing challenges.' 'Lack of leadership is partly responsible for the loss of skills, DWAF nationals.' 'Some leadership is still in place, enough to get by.' 'Equally important.' '280-95 municipalities do not have any technical engineers (professionals).' 'We have leadership but too few.'
Capacity	Interview transcriptions	Integrating multiple stakeholders and involving schools and communities improves capacity building. There is a lack of capacity to implement water initiatives.

		Capacity has been indicated by many respondents to be one of the three challenges in implementing the National Water Act. BEE is spotlighted as one of the causalities that created a lack of capacity. 'Human resources huge shortage, e.g. institutional knowledge at regional as well as at national level. Municipalities are even worse, very low technical something.' 'Skills and capacity, this is the fall down.' Capacity has also been highlighted as a constraint in effective cooperation on regulatory decisions between land-use planners and water managers. Regarding CMAs' implementation 'capacity issues that stop from creation and participation slow down the process' especially in KwaZulu-Natal. Capacity has been defined or equated to human resources and funding by some respondents. Some of the respondents indicated that there is a lack of skills and expertise and the experience in applying things are missing. In terms of funding one respondent indicated that the funding is there, but the money is always returned to treasury. Capacity is also linked to regulations and the consistency inherent in such regulations. One interviewee said that regulations are consistent with institutional capacity in water services and utilities, but not for water user associations. Political capacity: In KwaZulu-Natal before the premier was replaced, some indicated that he had the capacity and was innovative. South Africa is also in need of a vision and this vision needs to be clear about feasibility of decision, but there are no innovation and 'stand-up individuals.' For one interviewee, institutional capacity equates to the chief director to have the capacity to understand 'from the ground up to laws, understands global trends; and you need a vision, academic qualification and involvement with those (information exchange).' Another respondent said that we 'lack' implementation capacity and there is also a lack of compliance capacity since regulations are not in place. Municipalities do not have the capacity to implement water demand management. For another interviewee capacity also boils down to the filling of positions in the organisation which is not a top-down, but also a bottom function. In this regard, this individual said that you need to apply strategic adaptive management in that every situation is unique. 'Effective administration is the aim, mainly: planning, leadership and coordination/control. Capacity building is also a must if one wants to create less uninformed stakeholders.

		If need be, one could also contract with a non-governmental organisation like WWF to build capacity within the organisation.
Change	DUT meeting and interviews transcriptions	Alteration of environmental flows through dam constructions. Restructuring and staff transfers brings about change. Legislations and policy change in order to achieve equity and social justice. Changes within weather patterns (climate change). Change is not only seen in terms of climate change or a changing political landscape. Change can also be something that boosts morale. For instance, one representative of a CMA said that the CMA received its 'first delegation according to Schedule 3 of the NWA. With that the confidence in and attitude towards the CMA changed. With the delegation come enforcement powers and verification of water users was also delegated, but the latter is actually a responsibility function and thus can only be assigned.' Change management is another area some of the respondents touched upon. In one instance, the CEO of one of the CMAs changed the organogram since SALGA and water user associations were important. The CMA also engaged with the municipality of a large metropolitan city. So, change can also generated by the individual leadership of a CMA. On change management one of the CEOs also indicated that one must manage change and address fears at the same time.
Management	Interviews transcription and DUT meeting	Relevance of changes in weather patterns with regards to water resources management. Power struggles, management (representative group) holding on to power. Restructuring and introducing news ideas to develop management plan. Established organisations (CMFs). Resources conservation and sustainable development. Strategic adaptive management was flagged by one respondent to enable the CMA to perform its functions, which became specific activities identified for management of the CMA. It is also imperative to have record management system in place (e.g. filing system). Regarding archiving, National Archives approved a system for one of the CMAs. One of the established CMAs has a change manage committee in place. This committee is responsible for developing the change management plan, which is approved by the governing board. In this regard, transparency is crucial for accountancy. The CMA also holds monthly management meetings and staff meetings, with the CEO meeting every during every quarter.

		One CMA also said that as delegation are being implemented, the complexity around water resource management increases.
Decision-making	Interviews transcription	Required skills for effective and informed decision-making. One established CMA representative indicated that a skills-based governing board makes a significant difference in participation and decision-making within the governing board. Another representative from another established CMA indicated that at first the CMA interacted a lot with decision-makers like the Department of Water and Sanitation, but now more and more with water users.
Lessons	DUT meeting (Sabine Stuart-Hill presentation)	Report on the on-going project of lessons learnt from the establishment of CMAs in South Africa. One representative from an established CMA indicated it was good that the delegations came bit-by-bit, because lessons had to be learned and man powers were not available: 'You cannot do everything at once.'
Learning, improve, practice	Interviews transcription and DUT notes	Lacking resources to help improve learning environment and working space, (water management challenges). Work in progress. Knowledge sharing (learning from each other). To improve learning and the practices thereof, 'people are not interested in reports', according to one interviewee. People would like to see more 'user-friendly platforms for sharing information among water-related governmental and non-governmental organisations and with the general public'. Conferences are here an important platform for sharing and learning from others as well as workshops and colloquiums. Another interviewee indicated that 'adaptive cycles' are also important in learning, since they 'give people space and time to reflect and learn'. Not only is learning seen in abstract terms. One responded indicated that the loss of capacity in the case of the Department of Water and Sanitation (DWS) and with that loss of opportunity to buy into the National Water Act, internal learning and orientation is needed. Also on a negative note, another responded noted that 'institutional frameworks might not encourage the adaptive approach (flexibility), learning organisation not possible.' This respondent mentioned that this is one of the most relevant drivers to change in the South African water sector. One interviewee also identified the lack of learning experience, meaning that people are beyond their level of competence. This respondent identified this lack

		of past experience as one of the three main challenges in implementing the National Water Act, and by default CMAs. In terms of political capacity and the existence of influential champions, one interviewee noted that: 'Lots of learning is needed in regards to consequences of own action and funding the results lack into the system…'. There is also an opportunity to learn from other governmental departments, although they do not operate in the research space. One such department is the Department of Finance and the Treasury that are, seemingly, staffed by experienced people with a 'willingness to learn'.
Implementation	DUT meeting and interviews transcription	Improving resources management and decentralising responsibilities from national authorities giving local communities the opportunity to participate in decision-making by forming the organisation such as CMAs and CMFs. Financial constrains leading to lack or low implementation of management strategies and support tools. Water laws are operational and enforceable but implementation thereof is lacking (contradiction). Another responded said that regulations are consistent with institutional capacity for implementation, compliance, monitoring and enforcement. These are core functions of any CMA. Another interviewee said that he/she would like to see short-term political pressure being passed down to the implementation level, especially at the municipal level, where local government, an important stakeholder of the CMA establishment process, reside. Another respondent echoed this sentiment. Regarding the implementation of the National Water Act, one respondent noted that its implementation, on a scale of 1 to 5 sits at about 2, which is almost not at all implemented). Another respondent gave the National Water Act's implement 3 out of 5. A third respondent gave it 0. This is because there is not a clear implementation plan attached to the National Water Act. The same respondent noted that the Water Service Act sits at 4 but are not meeting targets. Another interviewee also gave it a 4. A third interviewee gave it 0.
Historical developments, past experience	DUT meeting and interview transcripts	There were centralised systems (capacity change). Top-down governance. One of the barriers to change in South Africa, which relates to the implementation of the CMAs, are a lack of 'past' experience linked to missed education opportunities. Projects that are likely to succeed are implemented by people with the most experience. Others also echoed this, especially in light of implementation capacity. In one instance, an interviewee noted that it is not finances that are an

		impediment, but lack of experience. Lack of experience is also spotlighted as one of the three challenges in implementing the National Water Act.

Process	DUT meeting and interviews transcription	Development requirements through time and space (e.g. the time it takes for the river to rehabilitate. Adequacy (is it enough). One interviewee spoke about the enabling environment and water policies that establish and secure transferable water rights when he said the process is necessary and must be in place. After the process had been established, it will take time for water rights to be transferred. One thing that can take time in this regard are human resources and skills that are lacking and slow the process down. Here process is described as an enabler. Process can also be a long-term activity. One respondent noted, with respect to reserve determination that determining is still in the process of being conducted. This means that the process of Reserve Determination is an on-going process and not a once-off event. This is also the case with the awarding of licenses and authorisations. Even so, this process needs to fair and transparent. This is also a long-term process because other government departments are also involved. In his case process has a specific nature. Another interviewee also noted that changes are needed to the National Water Act. This interviewee said that: 'Transformation and water entitlements are lacking as land reform is not happening but no water. And new owners need to know the overall process and entitlements, e.g. uMngeni is closed – so what happens now? What does closed mean and for which group?' In this case process again has a different specific nature, as in open and transparent. Here a process can be understood as 'a method of doing or making something' (OALD, 2013), but in a particular manner.
Policy, policy development	DUT meeting (Matume Mahasha presentation) and interviews transcription	Adjustments of legislations in order to find ways of improving implementation processes. Required as a guiding factor that needs to be followed when making decisions. Policy has been identified by one of the interviewees as one of the most important driving forces of change in South Africa. In particular he or she noted that one must have 'relevant policy to sustain change'. So, it is not just any policy, but relevant (!) policy. Remaining with change, another responded noted that there are no mechanisms for feeding results into decision-making and planning process because there are

		no ‘open door’ policy and no listening from community to ‘outside experts’. Here policy is framed within a specific activity. Another interviewee, when asked if water policies accord with overall national economic policy and related sectoral policies, he or she answered ‘yes’ because ‘the water policies and attendant funding mechanism fit together coherently and logically.’ A second respondent strongly agree with this fit. Another interviewee commented on this by saying that it does not always fit together. Yet another interviewee guarded against economist writing water policies. The fit between national water policy and overall economic policy was also linked to agriculture. The issue of cooperative governance was said to be a huge challenge in the fit between water policies and overall economic policy. In this regard, the willingness and enforcement mechanisms are missing. One of the respondents also said that one of the greatest barriers to change in South Africa is the lack of ‘understanding of value chain from policy to implementation.’
Establishment, before and after	Interviews transcription and DUT meeting	Supporting tools and communities are highly important for the establishment phase (e.g. CMFs are the chance for the success of the CMA establishment, because they give a reason to have representatives at the level that accommodates them. Sustainable development principle is more introduced at the establishment level even after the establishment process, there is a follow up on environmental management programmes, to monitor the progress within established tools. Governance configuration tools also forms a huge part when establishing processes take place. Financial constraints and funding issues.
Successes	Interviews transcription	Planning and leadership are the key concepts for success. One of the interviewees indicated that the effective participation is the decision of the CMA. She or he went on to say that the two existing CMAs are very effective. If you want to be successful you need to have the right people and skills in place. Here success is equated with effectiveness!
Strengths	Interviews transcription and DUT meeting (Sabine Stuart-Hill presentation).	Aim of the CMA project, trying to improve what is successful from the two operating CMAs and to address all processes that can improve the establishment of the other CMAs. Collaboration, research and knowledge sharing may help identify the strengths of CMAs.
Weaknesses	DUT meeting and interview transcription	Funding, lacking of integration and lacking knowledge transformation.
Causes	DUT meeting	Different issues for different stakeholders, as well as the system complexities.
Communication	Interview transcriptions	Communication between the Department of Water and Sanitation is not as it should be. One interviewee, for instance, noted that service delivery is not

		transparent and that communication in this regard is not done properly. This interviewee noted that the issue of free basic water is not communicated effectively. When asked about challenges in implementing the National Water Act, one interviewee said that stakeholders in the water sector are 'working in silos, now we are supposed to integrate when not talking to each (limited communication).' Another respondent indicated that 'it is not clear what is happening also [i.t.o. communicating changes to the National Water Act] or especially communicate to the people. They are our customers and need a lot of information.' This was also echoed by other interviewees. One respondent indicated that the communication of the context is important to 'make stakeholder (of any sector) aware of bigger picture. No buy-in as a focus on constraints rather in the short term and within silos. We do not have sense of community!' This was echoed by another person when asked about communication plans or campaigns attached to major water initiatives. This person said that 'you don't see a lot of those.' On compliance and changing water using behaviour one interviewee said that there is 'not enough communication around what to do to comply, public knowledge is also lacking.' When asked what the five strongest barriers are to change in South Africa, one respondent said that it is 'managing uncertainty; communication of knowledge (communicate more what is needed but what is useful).' There is communication between irrigation boards and farmers (the boards' customers).
Relationship	Interview transcriptions	Certain domain or issues can facilitate the relationship between government departments and CMAs and their stakeholders. One interviewee indicated that sanitation is an example of bridging water resource management and social development. On this note one respondent also mentioned that there is not a good relationship between local government and the Department of Water and Sanitation.
Stakeholders	Transcriptions of interviews	One respondent noted that the CMAs do communicate with stakeholders through pamphlets, power point presentations and also supply the minutes of meetings to them. Another respondent also mentioned that in terms of compliance to change water user behaviour, water restrictions stick where people experience restrictions and

		information also flow freely to stakeholders and the press through weekly information leaflets. A third interviewee noted that more communication with stakeholders are needed because 80% of stakeholders will identify data needs but do not know how or where to get the data from.

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CHAPTER 5: A QUALITATIVE DESCRIPTION OF PERCEIVED STRENGTHS AND WEAKNESSES IN REGARD TO CATCHMENT-BASED MANAGEMENT

This chapter has been taken in its entirety from an MSc dissertation:
Nakhooda, Z. in preparation. The establishment, operation and evolution of catchment management agencies in South Africa: lessons learnt from the Breede-Overberg and Inkomati catchment management agencies. MSc (Hydrology) Dissertation, University of KwaZulu-Natal, Pietermaritzburg, RSA.

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5.1 Introduction

Water resources in many parts of the world are coming under increased pressure (Herrfahrdt-Pähle, 2012) as a result of population growth, economic development and environmental degradation. Previously, water was managed according to a supply-demand approach (Gleick, 2003; Herrfahrdt-Pähle, 2012) where large reservoirs were built in order to keep up with increasing demands. This has had numerous negative impacts on society, the environment and the economy to an extent (Gleick, 2003). As a result, water management paradigms have continually evolved in order to enable better management of the resource (Taylor *et al.,* 2013). Integrated Water Resources Management (IWRM) is such an approach, which emphasizes that the resource be managed in an efficient and sustainable way (Herrfahrdt-Pähle, 2012; Schulze *et al.*, 2004; Schreiner, 2013). IWRM highlights the importance of integrating different sectors such as industry, society and the environment to equitably and efficiently manage water resources (Schulze *et al.*, 2004), whilst also offering space to negotiate trade-offs. A key concept to the implementation of the IWRM approach is that of decentralization[27] (Hooper, 2008; Blomquist *et al.*, 2005; Inguane *et al.*, 2013), i.e. the management of water resources at a more localised level (basin or catchment level). It promotes the participation of local stakeholders (individuals who have an interest in the water resource)

[27] The main objectives of a decentralized approach are: (a) the enhancement of stakeholder participation in decision-making, (b) efficient use of the resource, (c) and the equitable distribution of the resource (Inguane *et al.*, 2013).

in decision-making and is aimed at results in tailor-made solutions around water resource management (Blomquist *et al.*, 2010). Within the context of decentralization, a catchment or river basin is regarded as the preferred spatial scale in order to implement lowest level management (Inguane *et al.*, 2013; Blomquist *et al.*, 2010; Hooper, 2008). As an example, the National Water Act of South Africa (1998) has embraced that approach and is implementing catchment-based management.

Successful catchment management is a challenge (Blomquist *et al.*, 2005; Blomquist *et al.*, 2010) and depends on numerous factors such as the willingness of central authority to devolve power, the capacity of a local authority, finances available and the willingness of stakeholders to participate, just to name a few (Bourblanc and Blanchon, 2013; Blomquist *et al.*, 2005; Meissner *et al.*, 2013; Dent, 2012). Another major challenge for the implementation of successful decentralization is that of institutional set ups and arrangements (Inguane *et al.*, 2013). In this regard, researchers are emphasising two main institutions that need to be established to ensure successful decentralization of resource management (Inguane *et al.*, 2013), i.e. (a) the establishment of a catchment management agency (CMA), which is the responsible authority as delegated by the central government (Tapela, 2002; Agyenim and Gupta, 2012) and (b) the establishment of catchment management forums (CMF) which create a platform for stakeholders to meet and discuss their issues (Ribeiro *et al.,* 2012).

The South African National Water Act of 1998 (NWA) is hailed as one of the most progressive pieces of water legislation worldwide (Schreiner, 2013; Bourblanc and Umr G-eau, 2012). It strongly incorporates the principles of IWRM (Schreiner, 2013; Bourblanc and Umr G-eau, 2012; Herrfahrdt-Pähle, 2012) and the democratic concepts of continuous stakeholder engagement in the processes of water resources management and allocation (Dent, 2012; Sherwill *et al.*, 2007), therefore strongly promoting the management of water resources at a catchment scale (Bourblanc and Umr G-eau, 2012; Bourblanc and Blanchon, 2013; Schreiner, 2013). However, the implementation of the Act has only partially been successful and in other aspects has been weak (Schreiner, 2013; Stuart-Hill and Schulze, 2010). One of the weaknesses as mentioned above is the lack of establishing CMAs: The country was divided into 19 Water Management Areas (WMA) and a CMA was proposed for each of these areas. Of the proposed 19 CMAs, only two are currently operational, this being some 18 years later. The then minister of the Department of Water Affairs (DWA), now the Department of Water and Sanitation (DWS) (the central authority) reduced the number of WMAs to 9 in March 2012, stating that there are “a number of reasons including the technical capacity required to staff CMAs, and the challenges such a large number of institutions poses to the Department in regulating their performance” (DWA, 2012a). This change in approach has led to

uncertainties and many administrative issues that seem to hamper the establishment as well as operations of the CMAs.

Based on findings from a detailed literature review conducted, a number of issues with regards to the establishment and operation of CMAs have become prevalent and have been identified as key issues that hamper or promote so-called successful operation (Meissner *et al.,* 2013; Meissner and Funke, 2014; Bourblanc and Blanchon, 2013; Dent, 2012; Huitema *et al.,* 2009; Sherwill *et al.*, 2007).

These are:

a) **Funding** – Whether there is adequate funding available. Does the CMA have financial autonomy? What costs are incurred by the CMA with regards to operation, and also costs incurred by the national authority (e.g. Department of Water and Sanitation) in establishing a CMA.
b) **Knowledge Capacity** (**skilled and experienced professionals)** – Is there a lack of individuals with the relevant knowledge and skills employed within a CMA? Is the current staff able to effectively and efficiently carry out the tasks delegated to the CMA?
c) **Trans-boundary Issues** – Are there any agreements signed with downstream users? Where there any difficulties in reaching these agreements? How does this impact on the operation of the CMA?
d) **Institutional arrangements** – What is the relationship between the CMA and central government? Is there cooperation between the two authorities and to what extent? What tasks is the CMA meant to carry out and how these are undertaken?
e) **Co-learning/Adaptive capacity** – Does the CMA have the ability to adapt to changes, whether they are climatic changes or changes in national legislation? Does the CMA create a space wherein employed individuals can share knowledge with each other, or other organisations?
f) **Stakeholder aspects**[28] – To what extent does the CMAs interact or consult with stakeholders? Have they experienced any limitations in accessing stakeholders? What are the opinions of stakeholders towards the CMA and are the stakeholders satisfied with what the CMA offers?

It is important to note that the above-mentioned issues are not generic across all CMAs. In some cases, all of the above issues may be prevalent whereas in others they may have completely different issues altogether. Nevertheless, this study will focus on the above-mentioned issues only.

[28] Stakeholders are defined according to Freeman (1984) as those who are affected by or are able to affect decision-making.

Seeing that the establishment and operation of CMAs in South Africa has been relatively slow, it is important to gain a more detailed insight into the reasons of this. Therefore, the purpose of this chapter is twofold: (a) through the use of global case studies, identify activities that are successful in the establishment and operation of CMAs (develop a baseline) and, (b) using the baseline to assess the two established catchment management agencies in South Africa. The baseline study will focus on the above-mentioned issues as these have been found to be the most commonly established in the peer-reviewed literature. It is envisaged that a baseline for assessment would enable to distil lessons to be learnt from such processes as well as establish recommendations when designing future CMAs for South Africa.

5.2 Methodology

A baseline study is usually done to provide an information platform or a measurement, in order to monitor, measure and assess the progress of an activity, or the progress made in implementing certain activities (AusAid, 2005; ASARECA, 2010). Such activities could range from financial planning to service delivery within an institution. Each of which could be measured. It also looks at the effectiveness of these activities and how such activities are implemented, changed or evolved over time (AusAid, 2005; ASARECA, 2010). Baseline studies can be used for a variety of purposes such as carrying out evaluations, monitoring purposes and future planning (Freudenthal & Narrowe, 1993; AusAid, 2005). They help identify benchmarks or indicators when monitoring and assist in identifying targets. Through an evaluation, it then provides a basis for implementing change and also can force managers or organisations to be more efficient. Baseline studies provide the necessary background, highlighting crucial information, hence allowing for effective future planning and operations (ASARECA, 2010; Freudenthal & Narrowe, 1993). Thus, the methodology applied to this study consists of three broad steps. Firstly, a framework had to be identified to analyse actual catchment management against a performance metric or develop a benchmark. Secondly, through the use of specific, real-world case studies identified in the peer-reviewed literature, strengths and weaknesses of how catchment management agencies are operating can be identified. Further on in the chapter this will be called the baseline. The identified strengths and weaknesses will then be used as a baseline for comparing operational CMAs in South Africa and the database of cases drawn from the literature. Lastly, using lived experiences through the form of formal interviews a further analysis into the operation of South African CMAs will be conducted. It is important to note that the above steps are linked to each other. This will become clear in the results and discussion section that follow later.

It needs to be noted, that case studies from around the world were also reviewed, i.e. a multiple case study approach, so as to understand what activities or structures are

successful in the real-world to achieve successful catchment-based water resources management[29]. Strengths and weaknesses from the case studies were identified, based on outcomes from the cases, and hence used as a baseline to illustrate what is perceived as a strength or a weakness regarding catchment-based management. A multiple case study approach was chosen due to four specific reasons: Firstly, as alluded to by Yin (2003), the analysis of multiple case studies is well suited to researching phenomenon that is affected by contextual factors (Taylor *et al*., 2011). In this case, the establishment of the CMAs are strongly affected by contextual factors (Blomquist *et al.,* 2008), like the level of economic development of the country or the amount of skilled and experienced professionals available within the catchment area or country. Secondly, this design provides for an understanding as to why certain events occur (Taylor *et al*., 2011). These events could be changes to the funding structure of CMAs or even the expansion of the CMA's operational jurisdiction. Thirdly, case studies are deemed successful in attaining information through which a baseline can be determined for the assessment of an institution (Baxter and Jack, 2008), such as a CMA. Lastly, a multiple case study approach allows for the analysis of different characteristics in different contexts and locations. This is particularly useful in order to gain a broader view into different characteristics within catchment management practices so as to reduce bias in analysis (Baxter and Jack, 2008).

It is important to note that the CMAs in South Africa are unique in nature in that they attempt to bridge the gap between the resource and society. Achieving a balance between societal needs and environmental concerns is a complex arena in which to operate. Another important factor to consider is the location of the CMA (Nielsen *et al*., 2013: Blomquist *et al.,* 2008). As a result, for this study, cases were selected from different regions around the world. This was done in order to provide a non-biased approach during analysis. For instance, countries in a better economic state have more funds available (regarded as a better initial condition, hence easier application of the catchment-based approach) for water resources management compared to developing nations (Blomquist *et al.,* 2008). The use of a multiple case study approach enabled comparisons between different locations to be made and enabled the researcher to understand how these variations influence outcomes (Yin, 2003).

The case studies were analysed in terms of the issues identified in the literature (*cf.* section 5.1, bullets a-f), which were funding, knowledge capacity (skilled and experienced professionals), trans-boundary issues, institutional arrangements, co-learning\adaptive capacity, stakeholder aspects. For the purpose of continuity, all seven of the case studies

[29] Successful catchment-based management is defined as the sustainable, efficient and equitable use of water resources that incorporates a decentralized approach including active stakeholder engagement (NWA, 1998).

identified were analysed in terms of the above-mentioned terms. It is important to note that not all the cases covered all the issues listed above and also where information around other themes was present, this has been reported on. As alluded to earlier, a baseline can provide a useful guide to catchment-based water resources management by indicating perceived strengths and weaknesses. As water resources management is a complex arena (Black *et al*., 2014: Holzkamper *et al*., 2012), largely due to the connectedness of different sectors and actors, activities that may work well in certain contexts may not prove as fruitful in others. This may be due to numerous conditions, such as; complex interactions and reactions between society and the environment, or the economic and democratic status of the country, to name but two variables (Black *et al*., 2014: Blomquist *et al.,* 2008).

5.3 Results

5.3.1 Frameworks for analysis, the first step

As alluded to earlier on, decentralization of resource management has been strongly advocated internationally, with academics and policies supporting this view (Blomquist *et al.*, 2008). As such, the concept and approach of integrated catchment management (ICM) has been promoted as the most suitable manner in which to effectively and efficiently manage water resources in a sustainable manner (Holzkamper *et al.,* 2012; Horelemann and Dombrowsky, 2012). This approach recognizes that “natural processes in a catchment are connected through the hydrological cycle” (Holzkamper *et al.*, 116, 2012). As a result, actions in certain sectors bring about reactions in others (Holzkamper *et al.*, 2012). Such actions can then either have positive or negative impacts on the resource itself. Integrated management provides an opportunity to reduce conflicts and maximize the benefits around resource use (Mostert, 1999; Holzkamper *et al*., 2012) and therefore requires a holistic approach, as it overlaps numerous disciplines and affects the interests of many different sectors. As a result, it has been favourable to set up specific river basin organisations (RBOs) or CMAs for this purpose (Horelemann and Dombrowsky, 2012; Blomquist *et al.*, 2010; Huitema and Meijerink, 2014). Therefore, the author chose two frameworks of analysis for catchment-based organisations, as both assess decentralisation and the holistic performance of organisations such as the South African CMAs. These are the frameworks developed by Blomquist *et al.,* published in 2005 and by Hooper published in 2006.

Framework as developed by Blomquist *et al*. (2005)

The Blomquist framework identifies a number of institutional and political factors, which may be associated with the success or failure of catchment management approaches to

water resource management. The framework focuses on 4 primary sets of observable variables as illustrated in Figure 5.1. These factors are then hypothesized around the paths taken by each of these variables in order to gain insights into the successful or unsuccessful management of water resources. In simpler terms, for each variable, an outcome is determined which may be successful or unsuccessful based on other literature around catchment management (Ostrom, 1990; Hooper, 2006). Successful as defined by Dinar *et al.* (2007) as the redirection of resource use away from a destructive path, towards a sustainable one, and engagement of resource users at a local scale in decision-making regarding resource management.

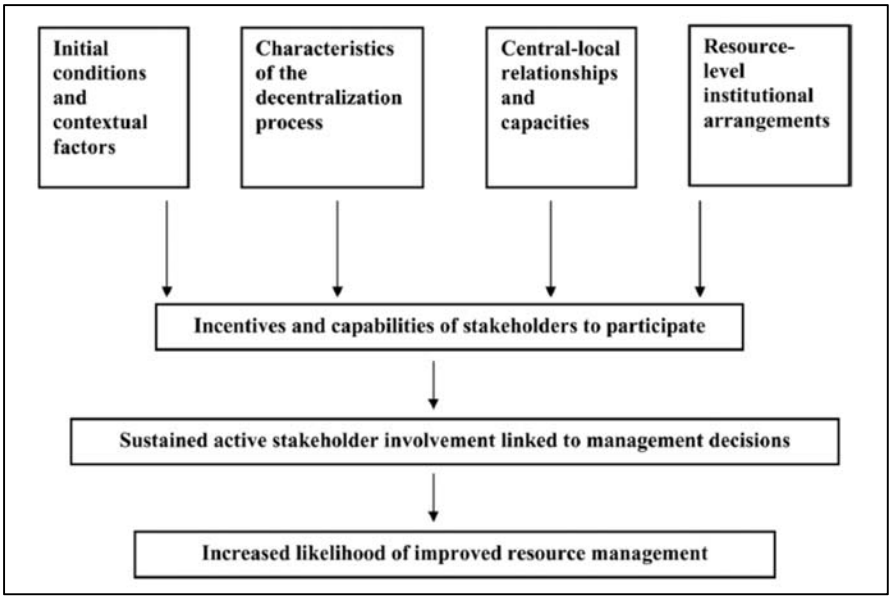

Figure 5.1: Simplified illustration of the framework developed by Blomquist *et al.* (2005)

Variable set 1: Initial conditions and contextual factors

Successful implementation of catchment-based management is dependent on the initial conditions that prevail prior to the establishment of an institution or organisation. The level of economic development of the country and area where in the organisation is to be established is an important aspect to consider. Even though a catchment-based approach serves to ease the financial pressure on central government, finances will be required in order to set up the institution and also provide assistance to stakeholders. Stakeholders and institutions would need initial capital so that decentralized efforts can be carried out. For instance, stakeholder meetings require a venue and create transport costs, which are to be bared by the central government initially. However, as the institution grows, thereby collecting its own revenues, the reliance on central government for funding will likely decrease. All other factors being equal, catchment-based management would, in theory, be of greater success in areas where the economy allows central government to provide adequate funding.

Another aspect to consider under the initial conditions is the cultural, social or any other distinctions amongst the resource users. These are regarded as important contextual factors as they are likely to affect the implementation and outcomes of a catchment-based management approach. Seeing that stakeholder interactions are an important part of catchment management; the above-mentioned factors play an important role in determining the level of implementation. Cultural and societal differences can be a cause for concern amongst stakeholders as the users are affected differently by the resource. That being said, successful implementation may be hampered where there exist vast cultural and societal differences amongst stakeholders.

Also, to be considered is the distribution of resources to water users prior to the establishment of a CMA. Disparities in the distribution of the resource can be a huge cause for conflict. Financially well-off or larger companies often have the “lions” share of the resource. As development occurs, more of the resource is needed, both for ecological and societal purposes. This creates a demand for the resource, which in turn could result in conflicts between stakeholders. There also exists the possibility that the larger “players” may have greater influence regarding decision-making.

Variable set 2: Characteristics of the decentralization process

Characteristics within the decentralization process also impact on the successful implementation of catchment management. Two necessary conditions for the decentralization process are: the distribution of power and responsibility to a local authority and the acceptance by the authority of its powers or delegations. It is also important to consider the motivation for taking a catchment-based approach. Is it due to government stepping away from taking full responsibility or is it due to discussions between local authority and central government, with the hope of improving resource quality and distribution?

Catchment management is more likely to be successful if the local governance structures are accepted by central government during the devolution of authority. Stakeholders commonly form part of groups of individuals. These groups have their own set of principles and guidelines. If central government incorporated these groups in decision-making, there would be greater correspondence and input from these stakeholders. It is also important to note that from a cost perspective, it would be more feasible as central government would not be required to construct separate institutions and go through the process of organizing stakeholders as these would already be in place. However, new organisations may be needed in order to better facilitate catchment management.

It must also be noted that changes in central government impact on local government or catchment management agencies, as these institutions are largely an actor on behalf of central government. There needs to be continuity in the policies around catchment management initiatives. Changes within central government should have no impact on

the CMAs. If such changes are felt by the CMAs, this could lead to a loss in stakeholder confidence, financial constraints and ultimately negative impacts on the resources.

Variable set 3: Central-local relationships and capacities

In order for catchment-based approaches to be successful, there needs to be cooperation between the CMA and central government agencies. The extent to which this occurs could be a determining factor in the sustainable management of the resource. CMAs may be created just as a symbolic show by government, but in essence central government still has total control over practices. Another extreme is that CMAs function without any aid or input from central government. Both the mentioned practices could lead to deteriorating conditions within the catchment, as both practices are not integrative. It is therefore suggested that a balance be found between the CMA, stakeholders and central government's influence. Stakeholders should not feel committed to resource management but should instead feel a sense of ownership. If for instance, a stakeholder doesn't get what he feels is his due, government and the CMA should work together with all the stakeholder to ensure a common consensus achieved with regard to such a request.

Finance is another important aspect that significantly impacts on the success of catchment-based initiatives. More importantly is the aspect of financial autonomy. If for instance, the CMA lacks any sort of financial autonomy with regards to the spending of funds, this could result in loss of confidence from both stakeholders and central government. This, however, should not entail that only CMAs be responsible for acquiring funding, but that also stakeholders contribute. This could be in the form of taxes, fines and donations. By including the funds from stakeholders, it would encourage greater levels of participation as members would want to see progress being made with the money invested. Together with finances come the issue of rights to the resource. How much of the resource goes to which stakeholder and why? Issues around equality and equity may arise. Therefore, a clear understanding surrounding the distribution of the resource needs to be determined so as to avoid conflicts. This would also make for easier collection of funding.

Institutional set up should not follow a one-size-fits-all approach. Efforts should be made in order to tailor the institutional set up with the needs of the location, as this would enable effective management of the resource. For instance, if central government is responsible for the design and implementation of a CMA, it is likely that key issues may be missed. Therefore, local stakeholders are encouraged to participate in the design of CMAs. This would also give the stakeholders a purpose as their issues will be heard and possibly resolved. Time should also be given to the CMAs to carry out tasks and conduct analysis around issues. It is important to note that different locations each have their own unique set of issues.

Variable 4: Resource level institutional arrangements

Governance structures at a local level form a critical component in the sustainable management of the resource. As such, successful implementation of CMAs also depends on the organisation of, and arrangements created by the stakeholders. Such arrangements may include a participation platform for raising concerns and resolving them or to share information.

The defining of boundaries is also a crucial part in catchment-based management. If the boundaries are ill defined, it could result in the inclusion of parties that belong to another catchment, hence, adding pressure on the budget. Similarly, exclusion of stakeholders could occur as a result of incorrect boundary delineation. These are issues that can be resolved from the onset of a catchment management approach. It is also similarly important to note that within a catchment, there may be boundaries as well. Groups of stakeholders may be isolated from others owing to various reasons such as spatial distribution or cultural norms. Identifying the needs and catering for these smaller domains is also important for the sustainable use of the resource.

Perhaps the most important aspect of catchment management approaches is the need to encourage stakeholder participation. It is therefore important to establish forums wherein grievances can be heard; recommendations and solutions can be developed in order to efficiently and sustainably manage the resource. Such forums are important in generating information and promoting cooperation amongst stakeholders and central government. These forums can also be used as a method of monitoring and enforcing the laws taken with regards to the use of the resource. Participants should be encouraged to monitor each other, as each one of them is affected by the use and abuse of the resource. For instance, if there is pollution occurring upstream, users downstream would be negatively affected. The ability of the forum to deal with these conflicts also plays a significant role in the sustainable management of the resource.

Framework as developed by Hooper (2006)

The Hooper framework was developed based on an international review of literature (published between 1970 and 2005) surrounding the concept of catchment or river basin management, interviews with personnel involved in catchment management practices and work done by aid organisations (Hooper, 2006). From this, a set of key performance indicators was developed. In total, 115 indicators of best practice regarding catchment management were developed (Hooper, 2006). Best practice is defined by Hooper (2006) as those actions or steps taken by managers or practitioners that resulted in successful catchment management. A majority of these indicators were observed from studies and experiences that had positive impacts on a catchment-based approach to resource management. It is important to note that there is no direct rule regarding best practice approaches to catchment management as conditions vary over space and time (Hooper, 2012).

The indicators Hooper (2002) developed can be used as a tool to assess the performance of a CMA. They provide insight into the performance and help identify areas that are lacking or where goals have not been fully met (Hooper, 2006). It is also important to consider the context or environment within which the indicators are being used (Hooper, 2006). For instance, the availability of funds will be different when comparing catchment management in a developed country with that of a developing country. Therefore, the context in which the indicators regarding finance will be different. According to Hooper (2006), indicators have three basic functions:

- Provide information, which, in turn, informs the public and also policy development.
- Evaluate policy influences.
- Describe and show policy implementation trends.

The methodology applied by Hooper (2006) consisted of a two-step approach. Firstly, known best practices in integrated river basin management were collected from numerous sources (see Hooper, 2006). Secondly, these best practices were then synthesized to generate a set of performance indicators. The criteria on which the indicators for the selection were chosen included the following (Hooper, 2006):

- Relevant and observable (relevant questions: Does it exist? Can it be observed?)
- Controllable (relevant questions: Can it be changed over time by mangers?)
- Realistic (relevant questions: Does it address real problems? Can solutions be found?)
- Understandable (relevant questions: Is it easy to understand by stakeholders, staff and management?)
- Subjective and objective data sets (relevant question: Can it be measured?)
- Achievement (relevant question: Can the indicator measured in terms of the level of implementation or achievement?)

The results showed that 115 indicators would be needed to assess catchment-based management in detail. Hooper classified these into 10 groups (Hooper, 2006):

1. Coordinated decision-making.
2. Responsive decision.
3. Goals, goal shift and goal completion.
4. Financial sustainability.
5. Organisational design.
6. Role of law.
7. Training and capacity building.
8. Information and research.
9. Accountability and monitoring.
10. Private and public-sector roles.

The application of these indicators is not generic for all CMAs (Hooper, 2006). The use of the above-mentioned indicators depends on the location of the institution, the age of the institution, political aspects and also the level of economic development within the basin. For instance, an organisation that is highly developed in a wealthy economy will almost certainly have greater financial and institutional capacity. It is also not necessary to use all the indicators when assessing an institution.

5.3.2 Case study selection and their analysis, the second step

For the purpose of this study, seven cases were selected that represent catchment-based resources management. Cases were selected from different locations so as to gain a deeper understanding into the processes associated with institutional operation and develop a more or less unbiased baseline for performance. The seven cases are:

1. The Murray-Darling Basin, Australia
2. Jaguaribe River Basin, Brazil
3. Fraser River Basin, Canada
4. Warta River Basin, Poland
5. Mahaweli River Basin, Sri Lanka
6. Sungai Langat River Basin, Malaysia
7. Tana River Basin, Kenya

The above-mentioned case studies were then analysed so as to determine positive and negative (strengths and weaknesses) around catchment management. These case studies will be analysed according to the themes (issues) identified in the literature under section 5.1 of this chapter:

Funding

In terms of funding, most of the CMAs are funded by Government or by donations received from various organisations such as the World Bank, and other NGOs, details are to be found in Table 5.1 below. This impacts on the ability of the organisations in carrying out tasks. Funding is often noted as the main constraint to successful resource management. Without which, no real action can be taken. In the case of the Mahaweli River Basin of Sri Lanka (MASL) adequate funding has been provided by the state, which has led to the maintenance of water infrastructure within the basin. This may not be the case in future, as the government tries to reduce expenditure within the sector.

Table 5.1: Illustration of the funding structure for the case study regions

River Basin	Current Funding Structure
Murray-Darling Basin, Australia	Government
Jaguaribe River Basin, Brazil	State government
Fraser River Basin, Canada	Public and private organisations, NGOs as well
Warta River Basin, Poland	Government
Mahaweli River Basin, Sri Lanka	Mainly government and some from donors
Sungai Langat River Basin, Malaysia	Government
Tana River Basin, Kenya	Government and donor

However, on the other end of the scale, the Malaysian, Polish, and the Brazilian case studies have only been partly effective, which is as a direct result of inadequate funding. In the Malaysian case due to budget constraints, it is not yet fully operational (Taylor, 2008). Additional funding is required to hire consultants to develop monitoring guidelines and enforcement rules as required. Owing to the limited financial and human resources available in the Malaysian case, the problems are addressed in order of priority along with other major water issues in the basin, i.e. water pollution (Taylor, 2008). With regards to the Brazilian case, it would be difficult to have basin level institutions as they would be unlikely able to generate funds in order to maintain the institutional needs. This can be highlighted by a lack of devolution of authority to basin level committees as they lack sufficient funds to carry out resource management. Nonetheless, there exists a legal framework for the establishment of a fund, from which the organisation can attain funds for resource management. Numerous sources of funding, such as fee collections and loans can be paid into this account. This would provide some degree of financial autonomy for the organisation. These funds could be used to cover expenses, whilst at the same time providing a reliable source of funding for the organisation. However, this is yet to be implemented. The Murray-Darling basin is also in the process of reforming policy so as to attain greater financial autonomy. The Tana Water Resources Management Authority (WRMA) has developed a Water Service Trust Fund (WSTF), with the aim of providing funds to poorer areas that have lacked adequate service. Since the establishment of this fund, numerous projects have been undertaken in order to maintain infrastructure. The WRMA is also in the process of developing a strategy through which it hopes to attain greater funding by:

- Generating revenue raised from the organisation operations
- Increased government funding
- Increased external donor funding, and
- Private sector participation
- Collection of water chargers

If the challenges of water resources management are to be addressed in these basins, intensive investment is required and funds must be available for operation and maintenance. As long as these financial resources are not existent, each RBO will set its own priorities, in keeping with funds available. This means that most likely environmental management will be lacking as water for the environment is often given less priority than other water uses. Again, the increase in financial autonomy will depend strongly on the enabling environment.

Institutional arrangements

Institutional arrangements as well as organisations themselves play an important role in catchment management. Institutions are the tools that are used to implement catchment management, while people/actors are the ones who do the actual implementation and take management decisions. In all the above-mentioned cases, there is some form of institution, be it at different levels within government, which is responsible for the management of water resources. These institutions work on different spatial scales, be it national, provincial and even local districts. The set-up of these institutions differs between the above-mentioned case studies as noted in Table 5.2 below.

Table 5.2: Nature of basin organisations

River Basin	Nature of Basin Organisation
Murray-Darling Basin, Australia	Intergovernmental basin commission, with a self-financed division for operating infrastructure on Murray River stem.
Jaguaribe River Basin, Brazil	River basin committees and commissions supported by a state water resources management company.
Fraser River Basin, Canada	Non-governmental organisation
Warta river Basin, Poland	Central government agency at basin scale.
Mahaweli River Basin, Sri Lanka	An authority under the Ministry of Mahaweli.
Sungai Langat River Basin, Malaysia	Statutory Agency at the state level.
Tana River Basin, Kenya	Regional office of national corporate body.

In most cases, the organisation is either a regional body of central government or the provincial government has developed it. The only special and unique case is that of the Fraser River Basin, which is a non-governmental institution. Owing to the nature of the basin organisations, the government plays a central role in water resource related decisions. In some cases, such as the Malaysian and the Sri Lankan case, central government assumes the role of decision-makers without public participation, as they are majority members on stakeholder groups. This has a negative influence as the decisions made directly affect local users. In the Murray-Darling Basin and the Tana River Basin, there are strong provisions made for public participation. Public participation is at the

centre of decision-making. These basins also have sub-basin authorities that promote participation and aid local water users.

In the case of the Jaguaribe River Basin, national government handed the management and planning of the basin down to a provincial level. This has been highly effective over time as the authority receives delegations from national government. However, moving from a provincial level to a more local level has been an issue within the basin.
Water resources management within the Fraser River Basin is unique in that management activities and decision-making is done by an NGO. One of the downsides to this approach is that projects are often handed over to other entities, usually government, for implementation. A positive to this approach is that the institution can cut across the various government department jurisdictions and allows for the participation of a wider range of stakeholders.

In the case of the Warta River Basin, stakeholder consultation was absent from the development of a River Water Management Association (RWMA). These associations act on behalf of the government. In Poland, provincial and local governments have jurisdiction to manage resources within its boundaries. The RWMAs often overlap these provincial and local boundaries resulting in clarity issues as to who is responsible for what and where.

Stakeholder aspects
With regards to stakeholder participation, there are mechanisms in place in all the above case studies, apart from one, the Warta River Basin in Poland. The mechanisms differ between the basins. Table 5.3 below provides a summary of the organisational structures in place for stakeholder participation.

Table 5.3: Organisational stakeholder structures within each basin

River Basin	Organisational stakeholder structures
Murray-Darling Basin, Australia	Community Advisory Committee with representation from basin sub-regions, water use sectors, and state and local governments
Jaguaribe River Basin, Brazil	Numerous user commissions at reservoir and valley scales, also sub-basin committees. Fairly limited involvement.
Fraser River Basin, Canada	Multi-sector council with representation from basin sub-regions, water use sectors, and all levels of government; regional councils
Warta river Basin, Poland	One being established currently
Mahaweli River Basin, Sri Lanka	Stakeholder participation takes place through a pre-cultivation meeting attended by the farmers and government divisions. Other users are not actively included.
Sungai Langat River Basin, Malaysia	Stakeholders can participate is by participating in ad-hoc Committees. Currently, three ad-hoc committees have been set up. However, state officials mainly represent these.
Tana River Basin, Kenya	Stakeholder participation is mainly achieved through participatory water management through Water Resources User Associations (WRUAs) at the sub-catchment level.

With regards to the Murray Darling Basin, all levels of water management are now conducted with stakeholder engagement. The same can be said Jaguaribe River Basin as the creation of sub-basin committees and water user commissions have significantly improved stakeholder participation. Water users in the basin are no longer merely users, but they also play an active role in decision-making. But their participation is fairly limited, as stakeholders often have no say with regards to certain processes that affect them directly. Also, mechanisms for conflict resolution, and to address past water allocations do not exist.

With regards to the Fraser River Basin, there are two authorities responsible for water resources management, the Fraser Basin Council and the Fraser Basin Society. The society and council is required to include the private sector and civil society in water resource related decisions. The council membership structure is diverse, allowing for the interest of numerous groups to be considered. The council provides a space wherein participation occurs and decisions are made. A similar approach has been taken in the Tana River Basin where Catchment Advisory Committees (CAACs) have been formed.

The CAACs have a similar role to that of the Fraser River Basin Council. Additionally, within the Tana River Basin, there exists Water Resources User Associations (WRUA) on a local level. These associations were actively vetoed for by the Tana WRMA and provide a space for conflict resolution.

In the cases of the Sri Lankan and the Malaysian case, stakeholder involvement exists, but do not promote the participation of all users. In the case of Sri Lanka, mostly the farmers and government officials are involved in decision-making. Whilst in the case of Malaysia, there is strong influence from government officials, therefore restricting stakeholder participation.

5.3.3 Analysis of the IUCMA and the BGCMA, the third step

Firstly, there was an attempt by the author to put the operational CMAs in South Africa (IUCMA and BGCMA respectively) through the above-mentioned frameworks by Hooper (2006) and by Blomquist *et al*. (2006). This was not successful, as there are numerous information and application gaps. Especially initial conditions, i.e. prior to CMA establishment, in terms of economic development, population dynamics and the water status of the catchment areas prior to CMA establishment are currently unavailable. Past studies on these catchment areas were conducted on individual sub-catchments or on more localised levels, therefore failing to incorporate the entire catchment area. Also, aspects around the decentralisation process were either vaguely reported on or difficult to gain access to.

It needs to be noted here that with regard to the relationships between central and local governments, opinions are divided between operating staff at the CMAs and the respective stakeholders. Some staff members reported that they had no issues with central government (DWS), whilst others certainly had issues. The latter mainly relating to data acquisition and transfer of databases from DWS to the respective CMAs. According to a staff member at the IUCMA, getting data from DWS depends on who you're dealing with and the relationship you have with that individual[1]. There also seemed to be dissatisfaction amongst staff at the IUCMA with regards to the role the DWS regional office played during the early days of establishment[3]. This was not so for the BGCMA; the interviews reflected full assistance and cooperation from the DWS regional office[4]. Also, the CMAs have received full delegation from the Minister of Water and Sanitation. However, certain aspects, as alluded to earlier, that were to be carried out by the CMAs are still with DWS regional offices[1,2].

In the case of the framework developed by Hooper (2006), the performance indicators did not provide a good analysis of the CMAs. The presence of certain indicators does not

necessarily translate to positive or negative impacts. For example, the existence of links between the CMA and the water user associations is present, but this does not translate automatically into a strength or a weakness. It could be one of the two, depending on how these relationships are carried out. The indicators need to be looked at in greater detail, such as the current extent or nature of the relationship between the CMA and the water user associations. Also, how do each of these associations interact with the CMA and what is the capacity of the CMA to address the issues of these associations.

5.4 Discussion

An analysis of the two operational CMAs is provided below in terms of the issues to establishment and operation identified above. The analysis consists of "lived experiences" attained through interviews conducted with operational staff at both CMAs and attendance of stakeholder meetings within the different regions (*cf.* section 5.7).

5.4.1 Funding

Funding is received by both CMAs from the Department of Water and Sanitation (DWS). Currently the amount of funding received is adequate[2,11] for the CMAs to carry out tasks according to its mandate. However, the issue was raised that there are certain limitations with regards to the monitoring of water quality[10], i.e. testing on a more regular basis and at additional points. The CMAs have received further delegations from the Minister of Water and Sanitation, but increases to the budget have not occurred proportionately[2,11]. One of the future functions envisaged is for the CMA to collect water tariffs from users within the catchment. But assessments show that should the CMA rely on these tariffs for operation, there would be a budget deficit of approximately 30%[2].
With regards to funding, both the CMAs have expanded the area that's covered under its jurisdiction. This has resulted in the establishment of an additional office in the case of the BOCMA[4,2]. In establishing this office, additional staff is required therefore requiring additional funding, but at the point of writing this paper there have been no provisions made by DWS[4,2] to cover such costs.

5.4.2 Knowledge Capacity (skilled and experienced professionals)

During the early days, the CMAs were severely under staffed[5] and lacked adequate guidance for structure and implementation from the department[11]. The CMA had no sense of direction and staff did not know what their responsibilities were [11]. Despite this, staff members persevered and showed initiative and as a result, the department began to trust the CMAs capacity and expertise to carry out delegated tasks. Currently the CMAs have

adequate staff with sufficient skills and experience to carry out all operational tasks of the CMA[3,2,4]. However, certain areas such as attaining employees with relevant engineering skills are an issue within the CMAs[4]. It is important to note that the CMAs are a unique environment and the skills needed are not often taught in mainstream education channels[5]. Aspects that are not completely understood, such as the operation of the DWS databases (e.g. WARMS) are learned on the job[5 4]. The majority of staff members, especially those in management positions have been at the CMAs since operation began. This illustrates that staff members value their jobs and feel a sense of responsibility and loyalty towards the CMA.

5.4.3 Trans-boundary Issues

The BOCMA does not have any issues with regards to trans-boundary water resources, as the entire catchment falls within South Africa. The IUCMA is one of the few trans-boundary rivers in South Africa. However, in all interviews and conversations this did not seem to be an issue or challenge for the CMA. Official treaties have been signed prior to CMA establishment[1] that handle most of the issues. There are a few instances in which water is released in order to meet the requirements agreed upon in the treaties[1]. This then is a legal requirement that the CMA has to meet and manage accordingly.

5.4.4 Institutional Arrangements

The CMAs were established by the national government in order to decentralise water resources management. During the initial stages, relationships between the CMAs and DWS were un-favourable[5,11] especially in terms of staff and data transfers. Documents were not easily transferred to the CMA and members were forced to drive long hours to regional offices in order to attain documents[5]. This problematic relationship still exists currently with regards to certain aspects such as acquiring data from department sources[4,5,1]. Despite the CMA receiving full delegations by the minister, certain aspects that fall under the functions of the CMA are still fulfilled by regional offices[3,1]. There seems to be reluctance towards the handing over of these functions[10].

Another institutional issue regarding both CMAs is that the area in which they operate has been increased significantly. CMAs were envisaged to decentralise water resources management, but owing to the increase in jurisdictional areas, i.e. reduced from 19 WMAs to 9 WMAs, this seems far from it and poses additional challenges for day-to-day management[4,10]. This being said, regional offices did in the one case actively advocate for the establishment of the CMA, i.e. BOCMA, in the region[6], while in the other case, i.e. IUCMA, this was not the case[11].

5.4.5 Co-learning

Co-Learning occurs between staff members within the CMA on a daily basis[4,5]. The BOCMA has additionally signed agreements with international water authorities, which aim at the sharing of knowledge and best practice aspects around catchment management[2]. At the same time some members of the IUCMA mentioned a silo approach exists with regard to day-to-day management[12]. This leads to a lack of collaboration in certain aspects[12] amongst some of the staff members.

5.4.6 Stakeholder Aspects

Within the jurisdictions of the BOCMA and the IUCMA numerous Water User Associations (WUAs) exist. These associations are groups of interested parties concerned with water usage, pollution of the resource and also the sustainable use of the resource. The WUAs are generally local groups of individuals and a variety of sectors, such as industry, farmers, civil society and NGOs are represented in these WUAs. On average, these associations meet four times per year to discuss water related issues affecting them[6].

Initially, stakeholders within the regions were sceptical regarding the CMA[6,3,13]. This was largely due to their past dealings with the department. Members of the WUAs were of the view that the CMA is just another government institution and that their issues around water utilisation would fail to be addressed[6,7]. CMA staff members had to build relationships with these stakeholders in order for them to develop trust in the CMA. The relationships could only be built through tireless efforts in dealing with issues facing the stakeholders. One of these is still partially unsolved: some stakeholders waited years for water use licences to be approved, and in some cases, they are yet to receive feedback from the department[8]. Another issue that the stakeholders raised was the travel costs incurred when going back and forth to local department offices[8,13].

At the WUA meetings, efforts are in place to ensure that all members are able to participate without any member given preferential treatment. The meetings are held at different locations, with the hosts being members of the association. This is done in order to reduce travel costs and encourage participation. The meetings were described as productive, as concerns of stakeholders are raised and solutions are developed[9,6,13]. One shortcoming observed at these meetings was that individuals with certain personalities often dominated proceedings[9]. Another one is that stakeholders responsible for certain aspects, e.g. pollution, tend not to attend when issues are arising and they are ‘at fault’. These stakeholder meetings occur on average every four months. This has impacts on decision outcomes, as there is a period of four months between review periods. However,

should there be any specific issue, the CMA has an open-door policy, allowing complaints, recommendations and access to employees for stakeholders at any time[6,7].

5.5 Conclusions

After conducting and analysing the catchment case studies, and doing the same for CMAs in South Africa, it is possible to identify a variety of aspects for benchmarking operations from these experiences. It is important to note that in the case of South African CMAs, not all aspects discussed necessarily apply. For instance, trans-boundary issues are not prevalent for the BOCMA, but for the IUCMA. As alluded to earlier, treaties have been agreed upon even before the IUCMA had been established that are dealt with by the Department of Water and Sanitation.

Financial aspects are key to the sound operation of CMAs; in the past financial resources were mostly adequate. However, with the vision of CMAs being finically independent from government and the extension of jurisdiction this is becoming highly problematic. If government reduces the amount of funding received by the CMAs, this would lead to budget deficits within the CMAs. In order for the CMA to effectively and efficiently carry out tasks included the newly assigned delegations and functions; more staff is required as well as the establishment of CMA satellite offices. The current situation of DWS does not allow for additional funds to be made available, which in the long-term will pose a threat to operations of the CMAs. Thus, the CMAs should include additional sources of funding, perhaps in the form of donations from external organisations, like the private sector. Another way to generate funding could be to place a minimal charge on stakeholders within the catchment. Perhaps if the stakeholders see positive results, they would be more inclined to pay an additional charge. An alternative could be to enforce environmental laws on polluters. The polluters should be ordered to pay fines for their infringements. Also, if the CMA were to receive funds only from user tariffs, this would not fully cover operational costs. A review of the manner in which funds are utilised should be conducted, so as to focus on priority areas.

In terms of adequate and competent staff, the CMAs currently face no issues. This was not so during the early days of the CMA. In order for the CMA to ‘hit the ground running’ staff from DWS that have roles that correspond to the CMA functions should ideally be transferred to the CMA. This however is a major stumbling block. Transfer of staff requires numerous processes and at times, the staff may not even be willing to relocate. Incentives should be in place to entice staff transfer to CMAs from DWS. The legal process involved in staff transfer should also be streamlined. However, current staff members are adequately trained and have sufficient experience in resource management. A positive aspect is that the majority of senior staff from the CMAs has been at the CMA since

inception. This ensures institutional memory and a high level of expertise within the organisation. The CMAs are performing well in this area within their sphere of influence.

As the area within which the CMA operates increases, i.e. this could be terrestrial and/or with regards to tasks and authorities, staffing issues will arise. Currently the CMAs are in the process of recruiting additional staff. This has been a tedious process as candidates with the required experience are difficult to find. In order to deal with this, the CMA should develop training and capacity building programs, e.g. an intern program. This would allow graduates to grasp the required knowledge needed for the CMA to operate effectively.

With regards to co-learning, the CMAs have formed partnerships with local and international water resource management agencies. This is a positive aspect, in that it allows for the transfer of skills between agencies. One issue with regards to co-learning is that CMA staffs are preoccupied with their own workloads. Within the institution, there seems to be a lack in the sharing of information between staff members. Having weekly meetings, during which staff members provide updates on projects and initiatives they are working on could prevent this. Another manner in which this could be initiated is tea breaks at the same time for staff members. This would then stimulate discussions between members.

Institutional relations are still a matter of concern. Opinions are however divided between staff members. Some members reported that they encounter issues with DWS staff regarding data collection. DWS staff is often reluctant to hand over data, or there are delays. In order to alleviate this issue, CMAs should be given access to these data sources. This would not only eliminate the reluctance of DWS members to hand over data, but also speed up data acquisition, resulting in greater efficiency.

Another issue is that of support from the department. Upon establishment, the BOCMA received little support from DWS regional offices, whereas the IUCMA received no support. Support from the department is essential for resources management, especially in the cases on the CMAs. The CMAs are essentially taking over responsibilities from the department, hence it is important to have a streamlined transfer of functions, data and possibly staff. One way would be policy intervention, and (or) clearer policies duties, roles and responsibilities. This would eliminate ambiguities and the duplication of duties and also provide additional guidance to both the CMAs and the department.

With regards to stakeholder aspects, the CMAs have been very successful in establishing excellent relationships with stakeholders. Numerous forums exist through which stakeholders can raise their concerns with each other and the CMA. The forums themselves initiate these meetings, and the CMA is invited to attend. On average, each

forum has four meetings annually. However, a few shortcomings exist. Firstly, the large area that the CMA operates in result in low stakeholder turnout at meetings, due to travelling expenses. At the same time efforts are made to ensure that stakeholders are able to attend by having the meetings at different locations allowing for easier access. Secondly, due to the four months gap between meetings, feedback on suddenly arising issues is limited. However, both CMAs have an open-door policy and stakeholders are welcome any time.

Another challenge identified was the limited involvement of local municipalities. Municipal representatives seldom attended stakeholder meetings. The opinion on the reason for this is that they are not willing to take the responsibility on them to tackle the challenges clean up their actions. Furthermore, it seems difficult to take the municipalities to task for their actions, as both, the CMA and the municipalities, are government institutions[3]. CMAs should be given more authority to take government institutions to trial for their actions.

Based on the above, some future research recommendations can be made. Firstly, there is an urgent need to generate a set of quantifiable indicators that are able to assess the performance of a CMA. Such indicators should be given a value in order to determine whether it is a successful practice or not, as values are often the easiest to illustrate effectiveness and efficiency. Secondly, these indicators should be uniform, and have the ability to be applied to various CMAs across the globe. A third recommendation would be to conduct more analyses on CMAs and provide greater detail in these analyses with regard to their performances. They should incorporate all aspects of catchment management, not focus on certain aspects such as, decentralisation or the implementation of IWRM principles only.

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1. Hydrologist, IUCMA, Interviewed on 25th June 2015
2. Senior Manager Water Resources, BOCMA, Interviewed on 25th August 2015
3. CEO, BOCMA, Interviewed on 24th August 2015
4. HR Manager, BOCMA, Interviewed on 24th August 2015
5. Water Use Officer, BOCMA, Interviewed on 25th August 2015
6. Institutional and Stakeholder Relations Manager, BOCMA, Interviewed on 24th August 2015
7. Water Use Specialist, BOCMA, Interviewed on 24th August 2015
8. BOCMA stakeholder meeting attended on the 26th August 2015.
9. Crocodile stakeholder forum (IUCMA) meeting attended on the 26th June 2015
10. Environmental Control Officer, IUCMA, Interviewed 24th June 2015
11. Board Secretary, IUCMA, Interviewed 23rd June 2015
12. Manager Marketing and Communication, IUCMA, interviewed 24th June 2015.
13. Community officer, IUCMA, Interviewed 26th June 2015

CHAPTER 6: SOME CRITICAL REFLECTIONS ON WHAT HAS BEEN ESTABLISHED, BEFORE DRAWING FINAL CONCLUSIONS AND RECOMMENDATIONS

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6.1 Setting the Scene

In the past chapters and sections a couple of key themes have been established, starting with the known literature (*cf.* Box 3.1) and further emerging themes from the research over the past years. These can be summarised as follows:

- **Financial constraints** – Experienced by the CMA with regards to operation, and costs incurred by the national authority (DWS) in establishing a CMA.
- **Knowledge Capacity** – Lack of adequate knowledge with regards to the role and functions of a CMA, by CMA staff and the national authority (DWS).
- **Skilled and experienced professionals** – Lack of individuals with the relevant knowledge and skills employed within a CMA.
- **Trans-boundary Issues** – Reaching agreements with downstream users (neighbouring countries) in terms of water volume and quality.
- **CMAs vs. DWA** – The type of relationship between the CMA and DWS and the level of cooperation between the two authorities.
- **Co-learning/Adaptive capacity** – The ability of the CMA to adapt to changes, whether they are climatic changes or changes in national legislation. This includes the ability of the CMA to create a space wherein employed individuals can share knowledge with each other, or other organizations.
- **Stakeholder participation** – The level at which CMAs interact with stakeholders, if there are any limitations and what the opinions of stakeholders are towards the CMA (including level of satisfaction).

6.2 Reviewing results of what has been established so far

The key themes listed above (cf. Section 6.1) include results established from the data collected within and before this project period. However, there is a potential bias from the

literature and the often-repeated discourses between researchers and stakeholders that may exaggerate some or even all of the recommendations to be established and that were published in Policy Brief No. 1 and 2. If the recommendations are to minimise weaknesses and maximise strengths of the establishment and operations of CMAs or similar organisations, such bias must be revealed and rectified if need be. Furthermore, the multi-relationships between the aspects should come to the fore in such a dense and multi-functional decision-making environment.

Thus, if certain themes are repeated too often in different contexts, or the opposite, certain themes are linearly connected to one aspect only, or if there are no cross-cutting issues emerging, the possibility is high that the recommendations overemphasise certain challenges or simplify potential solutions. Either way, a danger can arise assuming that one recommendation fixes all problems or there is only one recommendation needed to tackle one specific challenge. At the end of the day this could lead to panaceas being implemented and not resolving the root cause of problems or reducing the success of operations. Overall, the complexity of the different actors and their respective organisational environment would not be paid enough attention to. As alluded to context is key and thus we will reflect briefly in the following paragraph on the key aims and objectives of catchment-based management in South Africa and beyond, *viz.* the general aspects of IWRM, i.e. decentralization, integration and participation.

This can only be achieved when water resources planning and management is accompanied by effective governance and good decision support tools. These must not only *integrate* the three pillars of sustainability, i.e. environmental, societal and economic, but need to include built infrastructure, historical and political aspects as well. Only when approaching water management in such a holistic and integrated manner, useful interventions and successful management and governance will be possible. IWRM is due to its integrative and holistic approach said to be the path of dealing with short-term risks, but yet leading to long-term security of water resources beyond the current generation. Furthermore, the establishment of catchment-based management and CMAs respectively is aimed at *decentralization* of water resources management functions. In the same breath this means decentralization of decisions made around water resources, the environment, economic and societal issues. The aim of such devolvement is more tailored decisions for more localised problems and making management solutions more relevant, effective and sustainable. Thus, the promotion of *participation* involving all stakeholders at different levels may allow for more informed decision-making and improvement of knowledge sharing; this creating space of learning and adaptive management. According to some authors stakeholder participation may even be a step towards economic growth. However, the lack of effective governance and management

may have social, environmental, economic and political implications, which will then create imbalances within economic growth and development as well as unsustainability.

In Figures 6.1 and 6.2 we are linking the different themes identified so far with our recommendations (*cf.* Chapter 7 and Policy Brief 1 and 2 respectively). The recommendations are listed in Table 6.1 before the figures establishing the relationship between themes, recommendation and bias. The relationships are then discussed in relation to the main aspects of IWRM afterwards.

Table 6.1 Listing recommendations from Policy Briefs 1 and 2

Recommendations from Policy Brief 1 (PBR 1): "Practices for a CMA Establishment Process"	Recommendations from Policy Brief 2 (PBR 2): " Policy Brief on best practices of organisational culture and recommendations for successful relationships with stakeholders and other networks."
1 Be careful of 'panaceas' in how to establish a CMA in the quickest possible time. The establishment process does not happen overnight. **2** The National Water Act (Act. No. 36 of 1998) is a structure of rule that gives direction in the establishment of catchment management agencies. **3** Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgment. But keep all processes transparent and act trustworthy. **4** Plan the establishment process carefully, especially when it comes to human and financial resources. **5** Financial resources are a pivotal resource in the functioning of a catchment management agency. **6** Labour unions are also a stakeholder in the establishment of a CMA and their involvement is crucial. **7** The transfer of staff from regional and national DWS offices should be done in accordance with labour relations regulations, policies and practices. **8** Secondment of staff from DWS to CMAs might be a viable option in streamlining human resources issues. However, it is important to note that functions and job profiles of a CMA are different to a regional DWS office. Flexibility and responsiveness are key here. **9** Establish stakeholder relations on a good footing and sustain such relations.	**1** A safe and independent space of operation for the CMA is key. **2** Time is needed for trust building within the organisation and to external players and stakeholders. Funding and autonomy of the employee are key here. **3** Effective operations are only possible once all delegations have been assigned to the CMA. **4** Be careful of 'one size fits all' solutions. The uniqueness of each catchment with regard to biophysical, social and economic characteristics calls for tailored approaches and solutions. These also depend on the personality, knowledge and capacity of the individual employee. **5** Reinforced from Policy Brief 1: Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgment. But keep all processes transparent and act trustworthy. **6** Reinforced from Policy Brief 1: Establish stakeholder relations on a good footing and sustain such relations. **7** The assumption that operating CMAs lead to sustainable water management in short time periods and have the potential to reduce social unrests around water availability needs to be warned of. CMAs need time, funding and autonomy to learn what leads to success with regard to the biophysical-socio-economic interplay of the catchment. **8** Any decisions taken by DWS have a direct impact on the operations of CMAs.

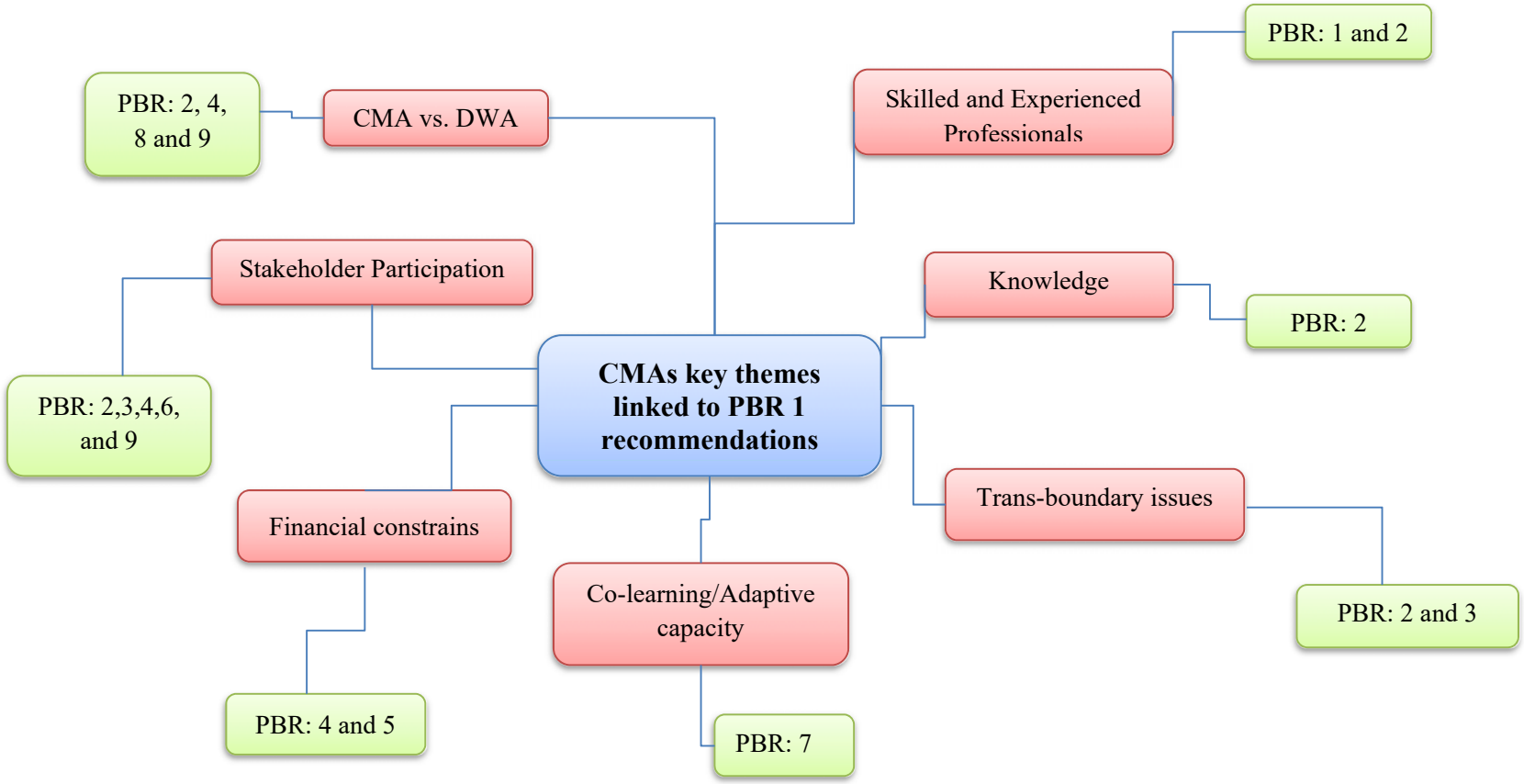

Figure 6.2: The links between the themes established and the Policy Brief 1 Recommendations (PBR 1)

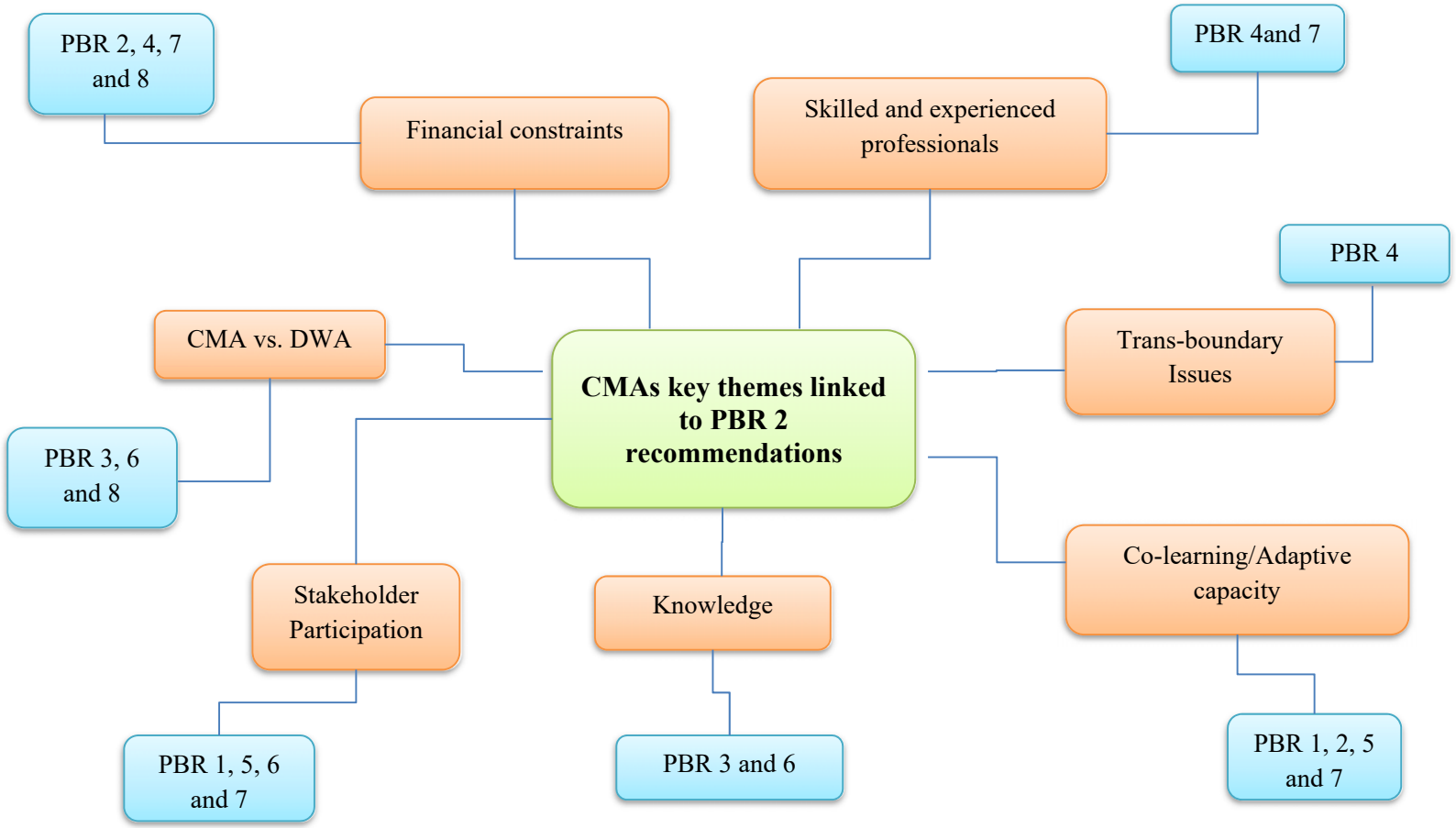

Figure 6.2: The links between the themes established and Policy Brief 2 Recommendations (PBR 2)

The recommendations established show a wide variety of facets with regard to technical, relational and contextual aspects for catchment-based management. Also, we were able to establish recommendations that cover both CMAs and their processes although they have shown different characteristics and different contexts.
The recommendations in relation to the themes show in both cases a varying distribution. Under Policy Brief 1 numerous recommendations are linked to stakeholder participation and the relationship between the CMA and DWS. In Policy Brief 2 the focus is on finances, learning and once more stakeholder participations. It can be seen that in the establishment phase building stakeholder relations and the formal dependence on DWS are dominating themes. This is not surprising as entering the catchment space brings about exactly that tension between the former centralised management approach that needs to be converted into a more bottom-up and stakeholder/communication centred management approach. With regard to the operational phase (PBR 2) the focus then shifts to organisational, technical and staff issues. Thus, recommendations dominate that focus on financial independence, and the learning environment in order to clarify existing ambiguities of roles and responsibilities. The stakeholder relation part is not surprisingly still an important issue and thus, has a strongly influential role with regard to the overall success of the CMAs. All of the above-discussed aspects again reflect the main issues of IWRM, i.e. integration, decentralisation and participation.

6.3 Conclusions

This exercise was aimed at a critical reflection on whether we are being biased in our analysis and recommendations. But it seems the merging of literature review and emerging themes from diverse water sector interactions was a successful mix in order to get an unbiased, and as we hope a constructive and holistic view on the matter on lessons learnt from CMA establishment and operations. This means that we are not bringing across what we believe in or what the known narratives amongst the water sector experts are.

The discussion under 6.2 has made clear that dominating themes (*viz.* majority of recommendations related to two (PBR 1) and three (PBR 2) themes respectively), are not reflecting a bias, but rather the necessities in those specific phases within a South African context, i.e. legal, relational and technical aspects. The recommendations include social, political and economic dimensions as their respective implication form a strong part of the overall water governance configuration within the catchments. Therefore, the dominating themes are key towards improving governance effectiveness and to improve economic growth and sustainable development. Success is dependent on these themes but must also be related to the other themes and recommendations. Only by acknowledging all dimensions of the respective processes and players within these processes can ensure success.

Politics and with this relational aspect seem to play out strongly in this space and these processes. Thus, it can be concluded that every CMA establishment process will be unique, depending on people involved from a national, catchment and local level. Further, learning, adaptation and innovation will play a strong role in the operational phase as staff on a daily basis have to moderate a complex environment with often varying conditions and configurations with regard to biophysical, social, economic and political dimensions.

CHAPTER 7: THE ESTABLISHMENT, ORGANISATIONAL CULTURE AND RELATIONSHIPS IN THE ESTABLISHMENT OF SOUTH AFRICA'S CATCHMENT MANAGEMENT AGECIES

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This chapter summarizes and concludes all the lessons we learnt from the lived experiences many decision-makers and stakeholders shared with us. Reflecting on them in the context we found them is showing a clear message: establishment cannot be separated from operations, governance not from management, and internal pressures not those from outside the organisation. Catchment-based institutions, when they cover a reasonable territory, are incubators for the diverse issues of society, economy, planning and implementation. The following Sections reflect the main lessons learnt from the establishment (*cf*. Section 6.1) and the operations (*cf.* 6.2) of the currently operating CMAs. Therefore, a seminar design is proposed under Section 6.3 that may sensitise decision-makers and leadership of the currently being established CMAs (*viz.* Proto-CMAs) to the issues and lessons learnt we have documented in this report. Further in Section 6.4 we suggest research that would help to 'dig deeper' into some of the issues in order to achieve further clarity on some of the relational issues we have come across.

7.1 Recommended Practices for a CMA Establishment Process

This Section has been acknowledged as a first Policy Brief, i.e. Policy Brief 1.

As discussed in great detail in the chapters beforehand the research team gathered information from a number of sources to distil the lessons learnt. Not only was there interaction with the two existing South African CMAs, the Breede-Gouritz and the Inkomati-Usuthu, as alluded to, we also consulted government officials from the Department of Water and Sanitation (DWS) that are involved in the establishment of new CMAs, most notably the Vaal River CMA and the Pongola-Usuthu CMA. A visit to the *Flussgebietsgemeinschaft* (FGG) Elbe situated in Magdeburg, Germany, in July 2015 and interactions with the FGG Elbe officials also gave valuable insights in the establishment of these kind of catchment-based organisation. The FGG Elbe was established in 2004 and therefore had been in existence for as long as South Africa's

CMAs, e.g. the Breede-Overberg CMA was established in 2005, with its governing board started operating two years later in 2007.[i] The interviews we conducted with the officials from the various catchment organisations gave valuable insight for practices in the establishment of CMAs. We gained insights into the lived experience of those directly involved in the day-to-day operation of a river basin organisation and the establishment thereof. Based on these insights this policy brief aims at distilling some best practices for establishing a CMA. We are organising this policy brief as follows. In the first section we will give a brief outline of the CMA establishment process. We will then discuss the practices involved in the establishment of the CMAs and the FGG Elbe as well as the operation of the organisations. Based on this we make a number of recommendations before ending with a conclusion.

7.1.1 CMA establishment process

South Africa's CMAs were established under the National Water Act of South Africa (Act No. 36 of 1998). In the case of the Breede-Gouritz and Inkomati-Usuthu CMAs, prior to their establishment, the water resources of the catchments were the responsibility of the DWS regional offices in the Western Cape and Mpumalanga Provinces, respectively. Water management took place through the water management area's internal strategic perspective.[ii] In case of the FGG Elbe, it was established to coordinate the implementation of the European Union's Water Framework Directive of 2000 and the Floods Directive of 2007 for Germany's federal states sharing the Elbe River basin. Prior to the establishment of the FGG Elbe, the German federal states sharing the Elbe River managed it in terms of Germany's national legislative framework.

Various stakeholders were involved in the establishment of both the above-mentioned South African CMAs and followed a negotiation process guided by the regional offices of the DWS.[iii] In case of the Inkomati and the Breede-Overberg CMA, a reference group was established, consisting of representatives from various sectors, such as agriculture, local government, emerging farmers and the tourism industry. The DWS was the most notable stakeholder assisted by private consultants.[ivv] These consultants helped in the preparation of discussion documents, facilitation of meetings, and focused on the interaction with role players around concerns and suggestions of stakeholders in their specific regions.[vi] In the case of the FGG Elbe, 10 German federal states were involved in the FGG's establishment. These federal states all share the Elbe River basin. Germany's Federal Ministry of the Environment was also involved in the establishment process. There is a similarity between the CMA's catchment management strategies and the FGG Elbe river basin management plan, in that in both cases the organisations had to develop their own river basin management plans.[vii]

Be that as it may, the original impetus for the river basin organisations' establishment was government or supra-national (European Union) structures of rule, *viz.* South Africa's National Water Act and two European Union Directives. It would appear as if in the South African cases, the process, after government direction, took on a more decentralised process with the involvement of various stakeholders from society and government. This was in line with the decentralisation vision set by the South African government in the post-1994 political dispensation, which favoured more involvement of organisations at grassroots level as opposed to the command and control vision of pre-1994 governments.

7.1.2 Practices

Alluding to the brief description of the river basin organisations' establishment process, we can identify a number of practices. The first of these practices relate to the structures of rule just mentioned. The National Water Act is central to the CMAs in that it gives the Minister of Water and Sanitation a strong influence to appoint the CMA's governing board. The governing board is to be representative of all stakeholders within the water management area (WMA). Even so, the CMAs are also at the same time quite autonomous and have mechanisms of democratic control, e.g. the establishment of relationships with similar organisations in other countries. The required catchment management strategy (CMS) for each WMA and CMA also sets principles for water allocation and considers issues related to water resource protection, use, development, conservation, management and control. These measures must be in line with the National Water Resource Strategy.[viii] However, a CMS is yet to be established for either of the CMAs. This is largely due to the incorporation of other WMAs with the current CMAs.[ix] [x] When the FGG Elbe implement the Water Framework Directive, significant water management issues had been derived by the federal states at a river basin level such as river continuity, nutrient loads and chemical pollution.[xi] In conclusion, a clear direction between national strategic initiatives, structures of rule and the management of the river basin organisation at water management area and basin levels, assists policy makers involved in the establishment process on what needs to be done and gives a clear direction on how to start the process. This includes clarity on functions, roles and responsibilities. There seems to be very little space for ambiguity, and uncertainty has a significant impact on the success of the establishment phase, which can carry through into the operational phase.

When it comes to the involvement of various stakeholders, previous research conducted on the Breede-Overberg CMA, indicated that it is not always feasible to include all stakeholders in a water management area in the development of the CMS. The sheer number of people that want to attend meetings can draw out the process unnecessarily and make it time consuming.[xii] The same applies to the Inkomati-Usuthu CMA, where a series of five stakeholder meetings and workshops were held by the CMA over the period of a year (2010) specifically around the development of a CMS.[xiii]

This will have a direct impact on the financial and human resource costs of establishing the organisation. This was also an issue that came up during interviews with officials from the FGG Elbe. In their case, they explained that because 10 different federal governments were involved, they had different economic and political interests in the management of the Elbe River. They also had different structures of rule influencing, for instance, the monitoring of river health. This can lead to a long time-consuming process to reach an agreement on certain issues.[xiv] It is here where officials need to plan the establishment process very carefully, especially regarding the allocation and consumption of financial and human resources. Careful planning could enable policy makers to ascertain where to draw the line when involving a certain number of stakeholders and can assist them in striking a balance between involving too few or too many stakeholders. With regards to financial resources, both CMAs currently receive sufficient funding from DWS. However, as the CMAs have become large spatial units with numerous catchments and sub-catchments, and by that further delegations are brought upon the CMAs, the allocation of financial resources may become an issue in future. Also, the CMA is envisaged to become self-sufficient, thereby attaining funds through receiving tariffs paid by water users. This could prove to be a major financial constraint as the CMA would receive approximately 70% of its expected budget through these tariffs.[xv] There are still questions with regards to the remaining 30%.[xvi] Planning the financial viability and security of the CMA becomes a key variable here and sufficient finances need to be allocated to enable the CMAs to ensure their ability to be responsive to the administrative and stakeholder demands.

Speaking of financial and human resources, establishing a CMA can be a demanding and taxing process from a public administrative perspective. Regarding human resources, for instance, the process can require vast consultation with employees from governmental departments that need to be transferred to the CMA once it has been established. One issue that needs consideration is that the offices of the CMA might not be situated near the regional or national offices of the DWS. This means that employees that had been travelling to the regional and/or national office(s) now might need to relocate to a different town so they can be closer to their place of employment. This is the case with the Vaal proto-CMA currently being established, which might be situated near Rand Water's head office to the south of Johannesburg. To transfer employees from the DWS offices in Pretoria will involve labour relations matters. Some employees might feel that they do not want to be transferred because of personal reasons. This will involve the negotiation of transfer policies not only at individual level but also needs to involve labour unions. This likely may lead to resistance from employees and low morale because they are uncertain about the implications of such human resource practices. Thus, it is recommended that labour unions are involved from the onset so that uncertainties can be minimised and employees take ownership of their transfers. Another issue with regards to the employment of staff is that there are no task specifically trained individuals. The CMA environment requires a different set of skills compared to the known job profiles of regional or the national DWS officials. This means that the majority of the tasks carried out by the CMA require staff

to learn as they grow within the CMA environment.[xvii] [xviii] Such learning needs an adaptive, responsive organisational set up, and a leadership that trusts its employees. Even so, we are not propagating the imposition of adaptive management theoretical principles on the organisation. What we are trying to say is that the organisation need not to restrict its learning environment to a set of law-like principles but the organisation's leadership need to decide for itself how it will apply learning practices.

On a separate note, transfer agreements will involve matters such as employee's pension funds, medical aid, salaries and salary levels, systems for salary payments, labour union representation, leave management and so on. What are at stake regarding human resources are not only the administrative processes, but also employees' perceptions around uncertainties regarding employment security.[xix]
What also needs to be considered is the difference between a trading entity and the main account of the DWS. A trading entity is funded from water users that pay for the water they consume, like irrigation boards. The staffs in DWS that belong to such trading entities are paid salaries from the trading account. The main account is the funding or budget that the DWS receive from Treasury. The challenge with this difference is that corporate management, excluding finance, has been servicing both accounts and the staff that might be transferred had also been serviced from both accounts. One way of getting around this administrative issue is to second people to the CMA once it has been established that will give added support to the CMA when it is operating sustainably. Another challenge is that hydrometry services might also move to the CMA from the main to trading account. This will also be the case for water use and regulation moving from the main to trading account. The issue with this is that the functions of these units are linked to the type of account and by moving the units will have human resource implications. For instance, service level agreements need to be in place between the CMA and the regional and national offices so that the services to be supplied by the DWS and/or CMA need to be well defined and stipulated.[xx]

Stakeholder relations are another important component of CMAs. Without which, decentralisation cannot be adequately achieved. In this regard, both established CMAs have relatively close and good relationships with stakeholders. This relationship, as with any relationship, had to be built from the onset. For instance, initially, stakeholders were reluctant to engage with the Breede-Gouritz CMA owing largely to challenging experiences with the DWS. For instance, certain individuals in stakeholder groupings have been waiting on DWS for numerous years with regards to licencing applications.[xxi] In this regard, stakeholders wanted to know how the CMA would be different from the way in which DWS carries out water related activities and tasks. In other words, there is an expectation from stakeholders that the CMA will, in certain instances, do a 'better job' than the DWS. The onus was on CMA staff attending the meeting to persuade the stakeholders, firstly, to participate in stakeholder meetings and explain the benefits of these meetings, and also to assure members that the past is the past and that the CMA would have other options at hand to assist

stakeholders with their needs.[xxii] This means that future CMAs would have to take note of stakeholder expectations and that expectations can be defining in establishing a relationship between the CMA and stakeholders.

7.1.3 Recommendations and conclusions

Within the establishment phase of CMAs, DWS should provide more resources and guidelines with regards to the initial functions of CMAs. This would enable the CMAs to begin operations fully understanding their roles and responsibilities. A comprehensive list of initial functions, including processes and tools required, beyond what is mentioned in the NWA of 1998 and possibly in the national water resource strategy, needs to be produced so that initial staff have an understanding and adequate guidance as to what is required of them. Including a staff member with a legislative background in the establishment process would be advised. This was lacking with regards to the Inkomati CMA as well as the Breede-Overberg CMA. [xxiii] The establishment of a proto CMA within DWS regional offices may be a good option. This would allow the CMA to "hit the ground running" as opposed to taking time to find its feet.

With regards to the financial aspects of CMAs' operations there are no issues currently, but for future development of the CMA this may be a constraint. DWS should continue to provide financial support to the CMA even after the CMA starts receiving water tariffs. This would not only highlight the support of DWS behind a decentralised approach to water resources management but will also enhance staff morale and give the CMA the ability to carry out an even wider range of tasks in developing water resources sustainably. The DWS could also consider the phasing out of such financial support.

Currently, stakeholder relations between the CMA and members within the WMA are relatively good. However, there is room for improvement when it comes to perceptions regarding the involvement of DWS in the establishment process. Trustworthy and constructive stakeholder relationships are central to the effective and efficient management of water resources and to an extent the success of CMAs. From current observations of several stakeholder meetings, it was observed that DWS officials always arrived late for these meetings, adding to the negative attitude towards DWS.

Currently the CMAs have adequate staff. Nevertheless, adequate does not mean that there are no shortages. Certain areas, such as water quality monitoring requires sufficient technical staff. This seems to be an issue at the Inkomati-Usuthu CMA as they outsource the testing of their water samples. The testing of samples has a very long turnaround time due to issues with the laboratory. If the CMA had its' own functioning laboratory, results would be obtained a lot faster and more water samples could be tested. This is just an example but can most certainly be applied to other

areas within the CMA. Even so, a decision to establish a functioning laboratory should not be taken in vein because the establishment and operation of a laboratory has its own logistical challenges, one which is accreditation from applicable regulatory bodies like the South African National Accreditation System (SANAS).

The establishment of a CMA does not happen overnight. There are a number of issues that need to be considered by the policy makers and stakeholders involved in the establishment of a CMA. These issues might not be major constraints. A small issue, like punctuality when attending meetings, can have a significant impact on the relationships between stakeholders and the CMAs. Policy makers should also remember that the establishment process is not only about pitfalls and challenges. There are also opportunities in the offing. One such opportunity is the knowledge of public administrative process held by DWS officials. Such knowledge can be a defining resource between a successful and stalled establishment process. In this regard, the knowledge of public administrators should not be viewed by stakeholders, scientists included, as another burden on the establishment process. Scientists have a tendency to not include public administration processes in their research endeavours when analysing CMAs. They would rather look at the streamlining of the establishment process. What we are trying to say with this is that this policy brief should not only be a set of recommendations for policy makers and stakeholders involved in CMA establishment processes, but also for scientists researching the process. Scientists are, after all, also a stakeholder when they research CMAs and also may be involved in some of the CMAs currently being set up.

Recommendations

- Be careful of 'panaceas' in how to establish a CMA in the quickest possible time. The establishment process does not happen overnight.
- The National Water Act (Act. No. 36 of 1998) is a structure of rule that gives direction in the establishment of catchment management agencies.
- Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgement. But keep all processes transparent and act trustworthy.
- Plan the establishment process carefully, especially when it comes to human and financial resources.
- Financial resources are a pivotal resource in the functioning of a catchment management agency.
- Labour unions are also a stakeholder in the establishment of a CMA and their involvement is crucial.
- The transfer of staff from regional and national DWS offices should be done in accordance with labour relations regulations, policies and practices.
- Secondment of staff from DWS to CMAs might be a viable option in streamlining human resources issues. However, it is important to note that functions and job profiles of a CMA are different to a regional DWS office. Flexibility and responsiveness are key here.
- Establish stakeholder relations on a good footing and sustain such relations.

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7.2 Best practices of organisational culture and recommendations for building successful relationships

This Section has been acknowledged as a second Policy Brief, i.e. Policy Brief 2.
The establishment of CMAs is aimed at the decentralization of water resources management functions (Ligthelm, 2001). Decentralization of decisions made with regards to water management promotes participation involving all stakeholders at different levels and this may allow for more informed decision-making and improvement of knowledge sharing. According to Beder (2006) stakeholder's participation may be one step towards economic growth and sustainability. Furthermore, effective governance is highly linked to the implementation of various water management frameworks or strategies such as IWRM. Systematically the adoption of IWRM approaches is very crucial because it is the path of short-term risks but yet leads to long-term security to water resources availability for today and for the next generation (sustainability) (Funke *et al.*, 2007).

Planning and managing water resources requires effective governance and management accompanied by good decision support tools for analytical water infrastructure and other facilities in a holistic and integrated approach (Labadie, Fontane *et al.*, 2007). Further, the lack of effective governance and integration may have social, environmental, economic and political implications, which will then create imbalances within economic growth and development as well as sustainability (Gabru, 2005). Therefore, with innovative approaches and 'doing things differently to the past, "Organisations will have to find and foster the champions of adaptive learning, including the visionary activist, the respected integrator and the rebel bureaucrat" (Gunderson *et al.*, 1995)

7.2.1 Organisational Culture

The culture of an organisation is its personality. The culture is important in the behaviour of an organisation's employees in that the culture determines they type of person seeking employment in a particular organisation. It is also important to note that organisational culture constitutes how people react or behave when they are in the organisation (Losey *et al*., 2005). These are important consideration especially in light of CMA's organisational culture. These organisations will predominantly be staffed by employees that have worked for extended periods in the public service. It is therefore safe to say that the CMAs will have a predominant public service organisational culture. This is neither good or bad, what is important to note is that the organisational culture might also be influenced by external variables. Here the stakeholders with which the CMA's employees come into contact can have either a detrimental or positive influence on the CMA's culture.

Another aspect that could determine the CMA's culture is how it will deliver services to those it serves. Here the notion of values comes into play. One way of looking at organizational culture is to view it as 'a pattern of values or basic assumptions' (Schultz and Hatch, 1996: 540) that is somehow predefined when employees are employed in an organisation. Regarding the new CMAs, the employees will bring certain values to the new organisation and over time these values will have an influence on the overall culture. In other words, how the CMA will serve its stakeholders could become a function of the employees and how they would want to serve their stakeholders; either as customers or as equals. That said, the organisational culture will evolve through the behaviour of a CMA's employees.

7.2.2 Conclusion and Recommendations

In the case of CMAs not only the successful and 'good' relationships to stakeholders outside government are core, although it may be assumed based on the CMAs legal grounding. In the course of our investigations we found that the internal and especially also governmental relationships are as important. Creative solution seeking and trust amongst the actors and especially decision-makers is most important for success.

Recommendations

- A safe and independent space of operation for the CMA is key.
- Time is needed for trust building within the organisation and to external players and stakeholders. Funding and autonomy of the employee are key here.
- Effective operations are only possible once all delegations have been assigned to the CMA.
- Be careful of 'one size fits all' solutions. The uniqueness of each catchment with regard to biophysical, social and economic characteristics calls for tailored approaches and solutions. These also depend on the personality, knowledge and capacity of the individual employee.
- Reinforced from Policy Brief 1: Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgement. But keep all processes transparent and act trustworthy.
- Reinforced from Policy Brief 1: Establish stakeholder relations on a good footing and sustain such relations.
- The assumption that operating CMAs lead to sustainable water management in short time periods and have the potential to reduce social unrests around water availability needs to be warned of. CMAs need time, funding and autonomy to learn what leads to success with regard to the biophysical-socio-economic interplay of the catchment.
- Any decisions taken by DWS have a direct impact on the operations of CMAs.

7.2.3 References

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7.3 A suggestion of a seminar for the leadership of CMAs in the process of establishment

One of the amendments to the proposal requested was to design a seminar for the leadership of CMAs, which are in the process of establishment. The objective is to ensure that the lessons learnt are passed on, and that this needs to go beyond purely written documents, i.e. this report and the two policy briefs. Such a seminar needs to ensure a space that allows for debate and inquiry so that the attendees are enabled to reflect on their own lived experience, the catchment and context respectively they work in and use this as a starting point. From this starting point the lessons learnt can then be applied and actions tailored in order to ensure success in the establishment and that this may carry through into the operational phase.

The format of a seminar was chosen on the background of the project, because it has a strong dimension of reflection, debate and learning. The term “seminar” has its origins in the Latin word “seminarium” (www.vocabulary.com). This word originally referred to a plant nursery, a place of great growth. From this came the German seminar, referring to a formal educational group led by a professor. While university seminars are most frequently small-group studies of a particular issue, the word is also applied to large lectures and commercial pitches. The definition according to www.vocabulary.com is “A seminar means a class or meeting, but it carries with it extra weight. An educational seminar indicates a small, advanced study, while a

meeting labelled as such means an intense exchange of ideas." The Business Dictionary defines seminar as "Formal presentation by one or more experts in which the attendees are encouraged to discuss the subject matter."

Based on the strong element of debate and learning and that people are limited with time, we suggest the following general conditions:

- A maximum number of 20 attendees, an optimum would be between 12 and 14 to ensure a conversational style that allows everyone to air views, ask questions, etc.
- The length should not extend 3 to 4 hrs to avoid fatigue and repetition
- An appropriate venue is important for attendees to feel relaxed and safe. Such a venue should be away from the work space and have limited distractions with regard to noise, business and distracting opportunities.
- The audience, target group of such a seminar should be more or less similar with regard to education, skills, and power. This will ensure a safe space for debate and airing opinion. It also should give opportunity to learn from each other's lived experience.

The suggested programme will be described in a general or rather generic sense. Organisers and facilitators need to be aware that based on the catchment and/or political situation and/or current issues the themes may vary and experts on specific issues need to be invited to speak to, e.g. conflict, team building, administrative issues, etc.

We suggest starting the seminar with an ice breaker that gets the attendees to relax, move through the room and realise that this is not a lecture or workshop, but a space of reflection and debate. This also aims at ensuring a trustworthy atmosphere where people feel comfortable.

One such an ice-breaker can be to ask everyone in the group to write down 3 provoking questions they would like to ask others in the group. Not the normal "what's you name" type questions but something like, "Where is the most interesting place you have ever travelled" or "Name a topic you feel absolutely passionate about". Give them time to mingle, and to ask three different people in the group one of their three questions. When getting back together and have each person stands up and give their name. As they say their name, ask the group to tell what they know about this person. Alternatively, one could do the Pocket/Purse Game, where everyone selects one (optionally two) items from their pocket or purse that has some personal significance to them. They introduce themselves and do a show and tell for the selected item and why it is important to them.

The second agenda point of the day should be for everyone to reflect on their own lived experience. Here it is crucial not to solemnly do this in the context of their work

environment but to distil people's cultural background, their values and milestones. Water should only play a role later in this activity and make clear to the participants where they are now.

Then three presentations should follow on the main topics that are reflected in the lessons learnt. We suggest these are:

- Organisational culture for empowering people and developing an atmosphere of trust. This section also needs to reflect on administrative issues and the flexibility needed to respond to challenges.
- The psychology of change and social learning, ensuring that attendees are aware of the continuous nature of both and that times of consolidation are crucial. Social learning needs to include the trust in the creativity of colleagues in solution seeking, their entrepreneurship and that a safe space exists for everyone to make mistakes.
- Communication as a tool for empowerment and relationship building – within the organisation, but also outside with stakeholders. Here the different stakeholder types and especially modes of participation need to be reflected upon.

After each presentation half an hour needs to be taken in order for attendees to ask questions and then to reflect the content on their own work situation.

Done correctly this will a time of great concentration and critical reflection. For some this also might be an emotionally challenging time. Therefore, we suggest the Ball Toss Game. This is a semi-review and wake-up exercise when covering material that requires heavy concentration. Have everyone stand up and form a resemblance of a circle. It does not have to be perfect, but they should all be facing in, looking at each other. Toss a nerf ball or bean bag to a person and have told what they thought was the most important learning concept was. They then toss the ball to someone and that person explains what they though were the most important concept. Continue the exercise until everyone has caught the ball at least once and explained an important concept of the material just covered.

The last half an hour or hour should be dedicated to developing a short individual document, summarising the most important lessons each one will take away from this seminar. These need to split into personal lessons, knowledge from each presentation, defining expectations for one's daily work in the team and leading the team. This needs to be linked to noting down one's own strengths and weaknesses with regard to what will be expected/needed. This short document should be handwritten into a file that has been given to the attendees including all the information and presentations of the day. It should also include the Policy Brief's one and two from this project. The idea would be that attendees can go back to this file any time to reflect on what was presented as well as on what they have noted down and important and challenging. It could then be even used for some personal reflections on ones' achievements and

performance. The seminar should be wrapped-up with an evaluation of the past hours aiming at optimising the format as well as identifying further knowledge or skills training that may be needed.

CHAPTER 8: FINAL CONCLUSIONS ON CATCHMENT-BASED WATER GOVERNANCE AND MANAGEMENT IN SOUTH AFRICA

This chapter is in its entirety a paper in draft format to be submitted to Water SA in the course of early 2017:
Meissner, R. and Stuart-Hill, SI. (in preparation). The Establishment of South Africa's Catchment Management Agencies: Where Governance and Management Meet. Water SA.

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8.1 Abstract

The establishment of South Africa's catchment management agencies may seem like a straight-forward endeavour because the process is seemingly elaborately outlined in the country's National Water Act (No. 36 of 1998). There is, however, more to establishing these organisations than meets the eye. Policy makers involved in establishing these agencies need to take a number of 'hidden' elements into consideration that are not explicitly or even implicitly mentioned in the National Water Act. The relationship between employer (in this case the Department of Water and Sanitation) and its employees is one of the key aspects, but also relationships to stakeholders and other actors are of high relevance. In the establishment, but especially in the operational phase of CMAs, aspects of good management and those of water governance go hand in hand. They actually occur in hybrid forms on a daily-basis and can make the establishment process as well as operations either smooth sailing or turn it into a nightmare. In this paper we highlight this and some other issues, like financial management, as a way to communicate some of the lessons learnt in establishing South Africa's catchment management agencies.

Keywords: Catchment management agency, management, water resources, human resources, public administration

8.2 Introduction

Since the National Water Act's (No. 36 of 1998) (Republic of South Africa, 1998) promulgation the Department of Water and Sanitations (DWS) and its predecessors,

have been implementing catchment management agencies (CMAs). The rationale behind this initiative is to give weight to an appropriate decentralised water policy (Funke *et al*., 2007) and, in effect, to establish effective water management institutions through which water governance and management are tailored to catchment specific needs. This specific need approach to river basin governance could enable integrated water resource management (IWRM) and adaptation on a day-to-day basis in decision-making (Stuart-Hill and Schulze, 2010). As such, catchment management agencies (CMAs) are key components of the National Water Act (Schreiner and Van Koppen, 2002). One of decentralisation's foci is public participation in water-related decision-making (Republic of South Africa, 1998; Meissner and Funke, 2014; Meissner *et al.*, 2016). Water policy makers believe that a decentralised water policy, manifesting in effective water management institutions, can have extensive and positive impacts on water quality and the sustainable utilisation of the resource. Water quality and sustainability are perceived as prerequisites for maintainable socio-economic development. Having said that, for the past 18 years policy makers, practitioners and stakeholders, at all levels of society, have been busy establishing CMAs in the nine water management areas stretching across South Africa's landmass. So far two CMAs have been established: the Breede-Gouritz and the Inkomati-Usuthu CMAs. At the time of writing, the other seven CMAs are being established. They are the Berg-Olifants, Limpopo, Mzimvubu-Tsitsikamma, Olifants Orange, Pongola-Mzimkulu and Vaal CMAs (Department of Water and Sanitation, N.d.). The latter CMAs are colloquially known as proto-CMAs since they are not yet fully established; the function is delegated to the institutional section of the regional DWS office until the governing board has been appointed by the minister. Be that as it may, within the domains of water governance and management, a lot of activity had been initiated and implemented to get CMAs off the ground. In this paper, we will reflect on a project, funded by the Water Research Commission (WRC), to document the lessons learnt in the establishment and operation of South Africa's CMAs since their inception almost two decades ago. Those lessons have shown to move between the spheres of governance and management continuously, with governance and management intermingling to such an extent that it is often difficult to separate the two processes. Therefore, CMAs are a space demonstrating the need for innovation, independence and trust especially in light of governance and management processes being interdependent of one another. In this paper we will highlight the main challenges the establishment process encountered over the years, as well as day-to-day management. We argue that the challenges emerging from numerous investigations lie in the domain where governance and management interact and often in a non-harmonious manner. To ameliorate the challenges of establishing a CMA, we argue that CMAs need to be organisational spaces enabling independent thinking, innovation and establishing trustworthy relations with stakeholders in- and outside the river basin.

To forward these arguments, we divide the paper into a number of sections. In the first part, we will explain the methodology we used during the research project. Following

this clarification, we will outline a number of definitions for the concepts 'governance' and 'management' and explain to the reader how the two activities differ from one another. We deemed it necessary to explain the concepts, and the differences between them, because they were concepts that we came across frequently during our research. Furthermore, different understandings of these terms seem to reflect different planning and economic cultures. In the penultimate section, we reflect on what we observed and learned during the project. We will do this reflection taking the 'governance' and 'management' concepts, as well as their differences, into consideration. We end the article with a discussion and conclusion. This last part will contain the lessons learnt in the establishment and operations of CMAs and which of these relate more to governance and/or management.

8.3 Methodology

In this section, we outline our research process. We followed a qualitative research methodology relying on face-to-face interviews, observations and the analysis of existing texts (Angen, 2000) to gather information. This methodology forms part of the interpretivist/constructivist research paradigm. We choose the qualitative research methodology because the interpretivist/constructivist's ontology, or nature of reality, is based on the notion that the researcher and reality are inseparable. In this regard, the researcher is both the observation instrument and the interpreter of the observed results. There is, therefore, a life-world or lived experiences in the reality of CMA establishment that needs exploration. This research paradigm views reality as mental constructs that are social and experienced-based, local, specific, constructed and co-constructed. In this regard, interpretivism's epistemology, or the relationship between the researcher and the things being researched, is that social reality is constructed through the actor's reference frame to the setting in which the actor is located (Lincoln *et al*., 2011; Ron, 2004; Creswell, 2012; Lincoln, 1985).

To unpack this further, the research team had been conducting research on various water resource governance and management topics for more than a decade. During this time, the researchers attended numerous conferences, workshops as well as statutory and non-statutory meetings discussing the establishment and functioning of CMAs. For instance, the co-author is part of the steering committee of the Pongola-Mzimkulu proto-CMA. She is, therefore, inseparable from the establishment process. In this respect, she can form mental constructs based on her lived experience as a member of the steering committee. This furthermore means that the lessons she learnt over the years were constructed through her reference frame in relation to the setting of the steering committee. Furthermore, she has been a member of two non-statutory bodies, called catchment management fora, within the aforementioned CMA, in which she acted as a formal stakeholder, citizen and observer. This means that the co-author was an actor, with agency in the establishing process of the Pongola-Mzimkulu CMA.

Her experience and reference frames will, therefore, form part of our gathered information.

To identify the lessons learnt and reflect on the challenges encountered by the various CMAs, we conducted a number of face-to-face interviews with relevant stakeholders involved in the establishment of CMAs in the past and presently. We also attended a number of stakeholder meetings organised by the two established CMAs: the Breede-Gouritz (BGCMA) and the Inkomati-Usuthu (IUCMA). We furthermore conducted face-to-face interviews with employees of these CMAs and the Vaal proto-CMA. Research team members spent four days with the IUCMA. During this time, they conducted interviews with the governing board and a number of staff members. We followed the same process within the BGCMA. Before the face-to-face interviews, we sent out the questionnaire to the two CMAs, but there was a low return rate and we decided to rather visit the CMAs personally. As mentioned earlier, we also conducted interviews with staff from the Vaal proto-CMA to ascertain how they are establishing the CMA and what lessons they have learned so far. We conducted interviews with the chief executive officer (CEO) and a staff member. Employees of the IUCMA we interviewed were: the Marketing and Communications Manager, the Control Environmental Officer and the River Systems and Data Manager. Employees of the BGCMA we interviewed were: the CEO, a Water Use Specialist, the Institutional and Stakeholder Relations Manager, the Human Resource Specialist and the Senior Manager of Water Resources. All-in-all we conducted 14 personal interviews with two Vaal proto-CMA employees, four employees of the Inkomati-Usuthu CMA, five employees of the Breede-Gouritz CMA and one with a Reference Group member of the Pongola-Mzimkulu proto-CMA.

We also conducted a literature review on the establishment of South Africa's CMAs. For this review, we relied on Meissner and Funke's (2014) published chapter entitled *The politics of establishing catchment management agencies in South Africa: The case of the Breede-Overberg Catchment Management Agency*. A review of this chapter enabled the team to identify influential actors, other than those staffing the CMAs, and policy makers involved in the establishment of CMAs over the years. The lessons obtained in this chapter from the interviews they conducted are incorporated into this study. We also utilised information from 34 semi-structured expert interviews the co-author conducted in 2009 and 2010 with diverse actors in the water sector, including many DWS and CMA staff for her doctoral dissertation entitled *Mainstreaming adaptation to climate change into decision making in the water sector: Concepts and case studies from South Africa* (Stuart-Hill, 2015). The experts interviewed by Stuart-Hill were from a number of institutions directly involved in water governance and management including, but not limited to, the DWS, CMAs, academics that are part of the National Advisory Committee to the Minister of Water and Sanitation and experts in the private sector as well as consultants. Whatever the case may be, '[all] 34 interviewees had significant years of experience in the water sector (minimum of 5 years, [a] maximum of 39 years)' (Stuart-Hill, 2015).

We also reviewed numerous articles, papers and Internet-based information sources (e.g. Seshoka *et al*., 2004; Rogers, 2000; Pegram 2001; Colvin *et al.*, 2008; Sherwill *et al.*, 2007; Brown, 2011). Through this review, we got a good idea of some of the issues that could surface during the interviews. These issues include finance; knowledge capacity in the CMA; skills, experienced professionals or the loss thereof; transboundary water management; a clear understanding of the CMAs' roles; co-learning; stakeholder participation and where the jurisdiction of the CMA and DWS start and end.

After we conducted the interviews, we transcribed them. We then identified a number of terms contained in the interviews to guide our analysis. These terms are lessons, learnt, improve, practice, implementation, historical developments, past experience, process, policy, policy development, establishment, before, after, successes, strengths, weaknesses and causes. After we had identified the terms and transcribed the interviews, we summarised the key messages of each interview or meeting, its relevance to the topic of CMA establishment and the lessons learnt so far. From the transcriptions, we started distilling key cross-cutting, content-related themes that emerged out of the research. This method is called the cross-sectional code and retrieve method enabling researchers to devise a common system of categories, which are then applied to the entire dataset to search for and find 'chunks' of labelled data. This is also a useful approach to make comparisons and connections across data (Spencer *et al*., 2003; Meissner *et al*., 2013). We identified the following cross-cutting themes: strengths and weakness, policy process, learning and improvement, historical development and past experience, processes and practices, pre-and post-establishment and causal mechanisms. The purpose of identifying themes in the transcripts and coding them was to ascertain to what extent the literature covered each of the themes. Said differently, to determine how many interviews and meetings the themes appeared in as an important focus area. By organising the data into a structured summary and identifying the key emergent themes coming out of this data set, it was possible to construct a good overview (Meissner *et al*., 2013) of the factors playing a role in the establishment of South Africa's CMAs and the lessons learnt.

8.4 Governance and Management Explained

The table below (*cf.* Table 8.1) contains different definitions of governance and management as well as the identity (nationality and academic or scientific background) of the authors who developed the definitions. These examples will explain the messiness of the difference between governance and management and where the overlap between the two concepts lies.

Table 8.1: Governance and Management Defined

Governance	**Management**	**Author's Identity**
"The notion of governance takes into account the different actors and networks that help formulate and implement water policy. Governance sets the rules under which management operates."	"Management refers to activities of analysing and monitoring, developing and implementing measures to keep the state of a water resource within desirable bounds."	Chemist (Pahl-Wostl); EU
The governance system is defined by the legal and cultural backdrop of a state. Scale is less relevant than under management. Sustainable governance can only occur in combination with sustainable management. Thus, governance and management reflect and highlight different aspects of the same decision-making system.	Management is strongly linked to the systemic, organisational and individual realities of a country and its society. Success is linked to the communication and cooperation abilities of individuals and their respective home organisations. Thus skills, leadership and scale are intrinsic features to management and are reflected in decision-making on a more or less daily basis.	Environmental Hydrologist (Stuart-Hill); RSA
Governance is not the province of government alone and includes informal institutional arrangements like voluntary codes of conduct for private businesses, professional procedures and partnerships among all sectors. These include numerous and varied arrangements, but an essential element is that they mobilise diverse constituencies to agree on common goals and to help realise them.		International biodiversity governing body (IUCN); Western
Governance is strategic. Governance involves making and implementing decisions. Governance is	Management is operational. Management is a tool for implementing decisions. Management determines	Natural scientists (Weston and Gogga); RSA

Governance	Management	Author's Identity
about making the big decisions about what must be done – for example, a decision that irrigation must be managed at the community level.	how those water resources are distributed equitably – when each farmer receives water and what type of mechanisms are used to deliver the water, for example.	
Water governance comprises of a "range of political, social, economic and administrative systems that are in place to develop and manage water resources and manage the delivery of water services at different levels of society".	"[…] management structures must be established to carry out the day-to-day tasks." Rogers and Hall "distinguish between the different functional levels in water management: operational, organisational and constitutional."	Global Water Partnership: Environmental Engineer (Roger); USA Water sector and water policy specialist (Hall); EU
The distinction between water management and water governance lies in the control function. Water governance controls water management to ensure that it fulfils its function.	Water management controls and monitors the usage of water resources, in order to ensure that the needs of society and the environment are met.	Civil and environmental engineer (Grigg); USA
Governance is about the interactive relations between actors that are often non-harmonious in an effort to create opportunities and solve problems.	Management refers to the day-to-day activities and tasks to reach a certain goal.	International Relations specialist (Meissner), South Africa

From the table above, when investigating 'governance' and 'management' in the water domain, it is important to take the following elements into consideration: time, scale (in terms of the water management area and geographical versus network perceptions of scale), organisational issues, decision-making and the (research) world view or paradigm of the person or entity that developed that definition. The researcher's worldview is of great importance. For instance, should a researcher have a positivist world view, there is a great likelihood that the research will define governance and management in a top-down, state or government-centric fashion highlighting the regulatory aspects of governance and management (e.g. Pahl-Wostl and Weston and Gogga). For instance, Pahl-Wostl speaks of different actors and networks, but elevates governance above that of management in that governance makes the rules of management (e.g. implicit top-down government-centrism). Grigg goes even further and speaks of control, probably strongly linked to the technological control paradigm that many engineers have. A researcher with a constructivist world view is more likely to highlight the bottom-up, non-state actor way of governance and management

highlighting norms and values instead of regulatory principles (e.g. the IUCN and Meissner). Others have a more relational, systems and scale related understanding (e.g. GWP and Stuart-Hill). Be that as it may, there is not fix definition of 'governance' and 'management' and the definitions are influenced by the paradigms of the people that developed them and probably the context they work in. Furthermore, governance and management in all definitions are closely linked and depending on the challenges faced by decision-makers. So, decision-makers are forced to move between these spheres, which are anyway established on a more theoretical basis. This is especially true for decentralised government and management systems, where goals and control mechanisms are established in a tailored fashion on a more catchment-based or localised scale.

8.5 The Realities of Catchment-Based Management: From Establishment to Operation

This section will reflect our learning during the project that focused on CMA establishment and operations in South Africa. Previously we thought of establishment being mainly policies and bylaws published by government and the minister, directives released by the CMA governing board and influences by role-players external to government. Operations were the 'nitty gritty' day-to-day things that the individual decision-makers are doing. However, the policies and legal aspects that inform establishment are still highly relevant during operations, mainly due to dynamics in the national governmental of South Africa, which lead to decision-making resulting in more or less continuously changing operation goal posts, funding and human resources. The on-the-ground realities of water resource management come into play at the same time. Often management translates into tasks during times of change and uncertainty and develops creative mechanism to bridge the current and known into the future and unknown. Thus, the establishment and operations of CMAs go hand in glove and governance issues melt into management and vice versa; there is not a neat and tidy separation between these processes.

Taking the above definitions of governance and management into consideration (Table 8.1), we will, in this part of the paper, bring this interdependence to light. This section is a rendition of our research results.

To the untrained eye, the establishment of South Africa's CMAs appears like a top-down government-centric process only. This is far from the truth. That government is involved is undeniable. The National Water Act (No. 36 of 1998), a structural governmental instrument gives effect to the establishment of CMAs. In general, South Africa's CMAs were established under this Act. For instance, the Act stipulates the Minister's role in the establishment process in that this government official appoints each CMA's governing board. In addition to these centralised top-down governmental functions and processes, there are also a lot of processes taking place that involve

non-state actors. Stakeholder engagement and the involvement of interest groups in the appointment of the governing board as well as the consultation processes for writing the catchment management strategies are good examples (e.g. Meissner and Funke, 2014; Meissner *et al*., 2016).

In the following sections we will first reflect on some of the lessons learnt regarding the top-down governmental processes before reflecting on the more 'invisible' activities regarding CMA establishment, like stakeholder engagement and governmental and non-governmental (administrative) procedures. As alluded to above, establishment and operation of the CMAs go hand-in-glove and at the same time governance and management dimensions merge. The processes are therefore interdependent, and this is an important consideration for prospective CMAs. It can be easy to get bogged down with the finer details of where establishment and operation begin and end, but when external – to government – players and discourses are relevant for decision-making, it is not useful to engage in definition seeking for governance and management. Should proto-CMA steering committees get stuck with where such separations and responsibilities lie, it could detract them from other aspects that are not as visible, but more important. We will reflect on some of these issues as we go along.

8.5.1 Establishment

One of the first lessons we identified regarding the establishment process is that getting structures off the ground is a demanding process. It is so because the initial activities involve a plethora of issues. One of the first things that the aspirant CMAs, particularly those covering large geographical area, had to contend with was the long distances travelled by the various internal and external stakeholders (Pers. comm. S. Nevhorwa, 10 June 2015). Getting everybody together and travelling between the different parts of the CMA's water management area takes financial resources and requires substantial organisational skills and timing. Not only that, the Vaal proto-CMA, for instance, also travelled to the Breede-Gouritz CMA (BGCMA) to learn from their established counterpart in the Western Cape (Pers. comm. S. Nevhorwa, 10 June 2015). Catchment management agencies are very much stakeholder focused and practice inclusive stakeholder engagement processes and travelling long distances to meet with stakeholders can be a demanding task. Further, key is the establishment of trustworthy relationships between different players/stakeholders, for which the CMAs have a dual role, that of a facilitator and moderator and a representative/stakeholder themselves as a representative of the custodian of the country's water resources.

Stakeholder engagement is strongly entrenched in the National Water Act (RSA, 1998). Because the National Water Act enshrines stakeholder engagement does not necessarily mean that the process will automatically be democratic. Reference Group members should remember that different groups and individuals can have 'different

levels of power at various points in time' (Meissner and Funke, 2014: 200). Geographical distance is therefore not the only variable to contend with, there can also be 'distances' between the levels of power stakeholders hold in the establishment process. We should also remember that power is not a static concept but a dynamic societal occurrence. A stakeholder, or group of stakeholders, could have had power during the establishment process, but its power can wane or grow stronger over time during the operational phase. Furthermore, CMAs make provision for stakeholders to participate in catchment management fora, and catchment steering committees. Stakeholders also function as part of the governing board (Meissner and Funke, 2014). That said, the identity of the CMA as an inclusive actor in water resource management should be one of the first things aspirant CMAs should note. Because of this identity and character, the involvement of various internal and external stakeholders and interest groups could be a determining factor in the establishment and, later, operational success of CMAs.

Various stakeholders were involved in the establishment of both the operating CMAs (BOCMA and ICMA, now BGCMA and IUCMA) and followed a negotiation process guided by the regional offices of the DWS. In both cases, a reference group was established, consisting of representatives from various sectors, such as agriculture, local government, emerging farmers and the tourism industry. The DWS was the most notable stakeholder assisted by private consultants. These consultants helped in the preparation of discussion documents, facilitation of meetings, and focused on the interaction with role players around concerns and suggestions of stakeholders in their specific regions (Meissner *et al*., 2016). However, it does appear that after government gave direction that management processes became a more decentralised process including innovations and creative solution-seeking processes that enabled the CMAs to bridge uncertain aspects of their functions and responsibilities. This was observed in all interviews with members of both operating CMAs.

As observed by Stuart-Hill in the establishment process of the Pongola-Umzimkulu proto-CMA (PUCMA), there were several meetings from end of 2012 to mid-2013 by the Steering Committee leading up to comments on the business case. In July 2014, a CMF conference was held in the uMngeni catchment, but no further activities unfolded. At the beginning of 2015 the call for governing board nominations went out, and a selection panel was appointed. In May 2015 the acting CEO of the proto-CMA was appointed. Queries on the further process of establishment and especially when the CMA would be operating (which basically only starts when the governing board has been appointed, which then appoints the CEO and actual, technical staff for the CMA) were answered with "there are still a few internal issues which need to be addressed"; it was hoped to be "sorted out in the next 2 to 4 months' time." All these steps have been in the responsibility of the DWS regional office with no opportunity for this to be driven by any other actor, be it from government or stakeholder side. Thus, since mid-2013, there have been no activities unfolding in the governance sphere, and there has been no communication to any of the external (to government)

players. Overall the process reflects a pure top-down approach; to a certain extent this is not a transparent process leading to a very powerful position of the regional DWS office and the acting CEO, respectively. However, the inactivity since mid-2013 seems to be linked to other developments as well, which are situated within national government and the national office of the DWS especially. Observations in the water sector by the authors over the past two years indicate that three main aspects are hampering the move into an operational phase of the proto-CMAs as well as the full delegation of functions to the existing and operating CMAs severely. These are firstly the transfer of staff from the regional offices into the CMAs, secondly the implementation of the Water Policy Positions (gazetted 30 August 2013), which also include significant goal post changes for CMAs and water user associations, and thirdly the merger of the two main pieces of legislation in the water sector, i.e. the National Water Act (1998) and the Water Services Act (1997).

8.5.2 Operations: Employee Relations

Another dimension, regarding geographical distances, especially for the large CMAs like the BGCMA, PU proto-CMA and Vaal proto-CMA, is where the offices would be located. Members of these organisations realised early on that this issue is not just a matter for debate in national DWS fora. Early on in the establishment of the PU, as well as Vaal proto-CMA, the issue of where the CMA's offices would be located became an issue with DWS employees. In the case of the Vaal proto-CMA aspirant employees would probably had to relocate from the regional office in Pretoria to the south of Johannesburg where the offices are planned to be located. In the case of the PU proto-CMA additional offices to Durban were discussed including Richards Bay (177 km) and Nottingham Road (136 km). The BGCMA are in preparation to open an office in George (323 km). This means that employees that had been travelling to the regional and/or national office(s) now need to relocate to a different town so they can be closer to their place of employment. To transfer employees from the DWS offices will therefore involve important labour relations matters (Pers. comm., S. Nevhorwa, 10 June 2015). Some employees might feel that they do not want to be transferred because of personal reasons. This will involve the negotiation of transfer contracts not only at individual level but could also involve labour unions. This currently leads to resistance from employees and low morale as mentioned in many of the interviews, because they are uncertain about job placement, salary levels and overall job security.

To transfer employees from the regional or national DWS offices, will also require other matters. Here transfer agreements between those employees getting paid from the department's trading account to the main account is worth mentioning. This will involve transfer agreements stipulating issues like pension fund payments, medical aid contributions, salaries and salary levels, systems for salary payments, the choice of government or private sector labour unions, leave management systems and so on. These issues need careful attention otherwise it could create perceptions of further

uncertainty for employees (Pers. comm., S. Nevhorwa, 10 June 2015; BGCMA interviews 2015). As an example: Employees that manage water 'on the ground', like water allocation officers, receive their salaries from a budget that is funded by water users like irrigation boards, ESKOM, mines and municipalities. This account is called the trading account, because it is funded by water that had been traded or sold by DWS to users. The main account from which other CMA staff is paid from is funded by National Treasury. One of the challenges regarding the separation of both accounts is that corporate services, excluding finances, have been serviced by both accounts. It is not impossible that corporate service employees that will be moved had been serviced from both accounts. One option that could be executed is to second employees to the CMA, until the CMA is financially viable and can pay people from one trading account. In this regard, aspirant CMAs should keep in mind that employee functions are linked to the different accounts. For instance, hydrometry is a trading account function, while employees in water use and regulation functions are main account functionaries. This could necessitate service level agreements between the CMAs and the provincial heads of DWS to stipulate which service would be supplied by which organisation (Pers. comm., S. Nevhorwa, 10 June 2015).

8.5.3 Operations: Organisational culture and learning spaces

The culture of an organisation is its personality and is important in the behaviour of an organisation's employees in that the culture determines the type of person seeking employment in a particular organisation. It is also important to note that organisational culture constitutes how people react or behave when they are in the organisation (Losey *et al*., 2005). These are important considerations especially in light of CMAs that are geographically close to water users and a main part of their function being relationship building and facilitation processes. These organisations will predominantly be staffed by employees that have worked for extended periods in the public service. It is therefore safe to say that the CMAs will have a predominant public service organisational culture. This is neither good or bad, what is important to note is that the organisational culture might also be influenced by external variables. Here the stakeholders with which the CMA's employees come into contact can have either a detrimental or positive influence on the CMA's culture.

Another aspect that could determine the CMA's organisational culture is how it will deliver services. Here the notion of values comes into play. One way of looking at organizational culture is to view it as 'a pattern of values or basic assumptions' (Schultz and Hatch, 1996: 540) that is somehow predefined when employees are employed in an organisation. Regarding the new CMAs, the employees will bring certain values to the new organisation and over time these values will have an influence on the overall organisational culture. In other words, how the CMA will serve its stakeholders could become a function of the employees and how they would want to serve their

stakeholders; either as customers or as equals. That said, the organisational culture will evolve through the behaviour of a CMA's employees.

With regards to the employment of staff it needs to be noted that there are no task specifically trained individuals. The CMA environment requires a different set of skills compared to the known job profiles of regional or the national DWS officials. This means that the majority of the tasks carried out by the CMA require staff to learn as they grow within the CMA environment. Such learning needs an adaptive, responsive organisational set up, and a leadership that trusts its employees. Even so, we are not propagating the imposition of adaptive management theoretical principles on the organisation. What we are trying to say is that the organisation need not to restrict its learning environment to a set of law-like principles but the organisation's leadership need to decide for itself how it will apply learning practices.

8.5.4 Establishment and Operations: Stakeholder relationships

Stakeholder relations are another important component of CMAs. Without which, decentralisation cannot be adequately achieved. In this regard, both established CMAs have relatively close and good relationships with stakeholders. This relationship, as with any relationship, had to be built from the onset. For instance, initially, stakeholders were reluctant to engage with the Breede-Gouritz CMA owing largely to problematic experiences with the DWS. For instance, certain individuals in stakeholder groupings have been waiting on DWS for some to issue licenses. In this regard, stakeholders wanted to know how the CMA would be different from the way in which DWS carries out water related activities and tasks. In other words, there is an expectation from stakeholders that the CMA will, in certain instances, do a 'better job' than the DWS. The onus was on CMA staff attending the meetings to persuade the stakeholders, firstly, to participate in stakeholder meetings and explain the benefits of these meetings, and also to assure members that the past is the past and that the CMA would have other options at hand to assist stakeholders with their needs. This means that future CMAs would have to take note of stakeholder expectations and that expectations can be defining variables in establishing a relationship between the CMA and stakeholders.

8.6 Discussion and Conclusion

The establishment of a CMA does not happen overnight. Involved policy makers and stakeholders need to consider a number of issues in the establishment process. These issues might not be major constraints. A small issue, like punctuality, when attending meetings, can have a significant impact on the relationships between stakeholders and the CMAs. Policy makers should also remember that the establishment process is not only about pitfalls and challenges. There are also opportunities in the offing. One

such opportunity is the knowledge of public administrative process held by DWS officials. Such knowledge can be a defining resource between a successful and stalled establishment process. In this regard, the knowledge of public administrators should not be viewed by stakeholders, scientists included, as another burden on the establishment process. Scientists have a tendency to not include public administration processes in their research endeavours when analysing CMAs. They would rather investigate ways on how to streamline the process. What we are trying to say with this is that this article should not only be a set of recommendations for policy makers and stakeholders, but also for scientists researching the process. Scientists are, after all, also a stakeholder when they research CMAs and also may be involved in some of the CMAs currently being set up.

A clear direction between national strategic initiatives, structures of rule and the management of the river basin organisation, can assist policy makers involved in the establishment process on what needs to be done and give a clearer direction on how to start the process. This direction includes clarity on functions, roles and responsibilities. There needs to be as little space left for ambiguity as possible, due to the fact that uncertainty has a significant negative impact on the success of the establishment phase, which then will probably carry through into the operational phase.

When it comes to the involvement of various stakeholders, previous research conducted on the Breede-Overberg CMA, indicated that it is not always feasible to include all stakeholders in a water management area in the development of the CMS. The sheer number of people that want to attend meetings can draw out the process unnecessarily and make it time consuming. The same applies to the Inkomati-Usuthu CMA, where a series of five stakeholder meetings and workshops were held by the CMA over the period of a year (2010) specifically around the development of a CMS. This will have a direct impact on the financial and human resource costs of establishing as well as operations of the organisation. A strategic, wise and well-argued approach is needed to ensure no stakeholder group feels alienated should a more targeted approach to participation be implemented.

With regard to the establishment process the following recommendations can be made:

a. Be careful of ‘panaceas’ in how to establish a CMA in the quickest possible time. The establishment process does not happen overnight.
b. The National Water Act (Act. No. 36 of 1998) is a structure of rule that gives direction in the establishment of catchment management agencies.
c. Plan the establishment process carefully, especially when it comes to human and financial resources.
d. Financial resources are a pivotal resource in the functioning of a catchment management agency.

e. Labour unions are also a stakeholder in the establishment of a CMA and their involvement is crucial.
f. The transfer of staff from regional and national DWS offices should be done in accordance with labour relations regulations, policies and practices.
g. Secondment of staff from DWS to CMAs might be a viable option in streamlining human resources issues. However, it is important to note that functions and job profiles of a CMA are different to a regional DWS office. Flexibility and responsiveness are key here.

With regard to organisational culture, it has been eluded to earlier that this will evolve through the behaviour of a CMA's employees. Thus, in the analysis and lessons learnt a strong element of learning and personal relationships came to the fore. With regard to the establishment process the following recommendations can be made:

h. A safe and independent space of operation for the CMA.
i. Time is needed for trust building within the organisation and to external players and stakeholders. Funding and autonomy of the employee are key here.
j. Effective operations are only possible once all delegations have been assigned to the CMA.
k. Be careful of 'one size fits all' solutions. The uniqueness of each catchment with regard to biophysical, social and economic characteristics calls for tailored approaches and solutions. These also depend on the personality, knowledge and capacity of the individual employee.
l. Be innovative and adapt on your own terms and learn as you go along. There are no set rules on how to do this, use your judgement but keep all processes transparent and act trustworthy (this recommendation had already been identified with regard to the organisational establishment).
m. Establish stakeholder relations on a good footing and sustain such relations (this recommendation had already been identified with regard to the organisational establishment).
n. The assumption that operating CMAs lead to sustainable water management in short time periods and have the potential to reduce social unrests around water availability needs to be warned of. CMAs need time, funding and autonomy to learn what leads to success with regard to the biophysical-socio-economic interplay of the catchment.
o. Any decisions taken by DWS have a direct impact on the operations of CMAs.

Reflecting on the lessons learnt listed above and linking these to Table 8.1 outlining governance and management definitions, we are concluding in Table 8.2 which of those lessons learnt relate more to governance and which relate more to management. Stated differently, how strong is the governance and management dimension of each lesson identified for the establishment and operational phase of a CMA? Such understanding and insight will enable the CMAs and its staff to act and engage more meaningful and targeted. At the same time, it will give more certainty to

roles and functions, as well as helping to identify core activities for the operation of CMAs, now and into the future.

Table 8.2: Recommendations based on management and governance

Recommendation (a-o)	Management Dimension	Governance Dimension
a	X	X
b	X	
c		X
d	X	X
e	X	
f		X
g	X	
h	X	X
i	X	X
j	X	
k	X	X
l	X	X
m		X
n	X	
o	X	X

Based on Table 8.2, we conclude that seven of the 15 recommendations are covering governance and management aspects simultaneously. This further highlights the statement that governance and management are not only static processes but also interdependent in that the two processes change from the one to the other under certain circumstances (e.g. elections, resource classification, advising on water licensing, verification of water allocation just to name a few changes management into governance and vice versa).

There is always governance AND management in tandem. Governance is always there even if you do not have human interaction because governance is a neutral ideational causal mechanism. Management is just as important as governance as its absence has severe consequences for development and monitoring and enforcement. Based on scientific theory only a balance of the two can lead to integrated and sustainable management. So, separating the two is not possible when operating a CMA. In addition, the establishment process has far-reaching consequences for operations, be it with regard to stakeholder relationships, staff moral and learning ‘spaces’.

One of the glaring gaps we identified during our research is that research scientists are quite reluctant to investigate public administration process like public finance and human resource matters. For the officials we interviewed, public administration

processes play a central role in the establishment of CMAs. One of our final recommendation is thus to advocate for research that investigates public administration processes in water resources management more closely. Another question we have come across several times in our investigation is that of is the South African management and governance regime is increasingly recentralising or is moving towards a decentralised regime as originally advocated? Thus, our second final recommendation for further investigation is to investigate drivers, ideas and politics that have and are driving South Africa towards centralisation or decentralisation.

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