Assessment of the governance context surrounding the implementation of desalination plants in Cape Town, South Africa

Emily Bankert, Oscar Bradley & Demi Spaander

Abstract

Over the past fifty years, rapid population growth and climate change have strained Cape Town's water supply system to the point of crisis. Due to this current crisis, many underlying issues have come to the forefront, such as: the over reliance on single bulk water sources (e.g dams); the leaking of outdated distribution pipes; the overconsumption of water in the city; just to name a few. These issues can and are being solved by the implementation of new technologies such as desalination, leak detection systems, smart meters, large campaigns incentivising mass behavioural change and many more. However, due to Cape Town being in a crisis state, much of the implementation of these mitigation strategies is focused on the short-term crisis and not on long-term water security. This is especially true for technologies such as desalination which are currently being implemented by external companies to supply a thirsty market with water on contractual running times of two years.

This research was conducted to investigate the governance context surrounding the implementation of desalination technology through a literature review and a qualitative analysis using the Government Assessment Tool. By doing this, the research aimed to discover how the government is adapting and regulating desalination technology in order to understand whether sufficient measures are being taken to implement a long-term sustainable solution or short-term crisis alleviation solution. Based on this analysis, it is seen that short-term crisis alleviation desalination technology is being prioritised over long-term sustainable water security solutions. However, this has manifested positive aspects of governance such as policy intensity, collaboration, trust, recognition of mutual dependence as well as resource and responsibility delegation, pooling and flexibility. Therefore, it is recommended for SA to adopt these positive aspects of governance which are seen during the crisis into the regular governance beyond the crisis. However, this must be coupled with intense collaborative planning, construction, operation and monitoring of involved actors to ensure the economic, social and environmental sustainability of desalination projects.

Keywords: governance, Cape Town, desalination projects, water crisis

Table of Contents

1. Introduction	3
1.1 Problem context	3
1.2 Desalination overview	4
2. Framework & Methodology	5
2.1 Theoretical Framework	5
2.2 Methodology	7
3. Case description	8
4. Governance Assessment of the Context	11
4.1 GAT - Levels and Scales	11
4.2 GAT - Actors and Networks	12
4.3 GAT - Problem Perspectives and Goal Ambitions	13
4.4 GAT - Strategies and Instruments	15
4.5 GAT - Responsibilities and Resources	16
5. Summary of findings	17
6. Discussion	19
7. Conclusions	20
8. References	21
9. Appendix	25
Appendix A - Questionnaire based on the Government Assessment Tool	25

1. Introduction

1.1 Problem context

Cape Town, South Africa (SA), is facing a water crisis due to a multitude of issues being manifested through two main pressures, namely, climate change and rapid population growth. Firstly, climate change has led to the unpredictability of weather conditions and lack of rainfall in recent years (Muller, 2018). Secondly, rapid population growth has resulted in the population increasing by sixfold since 1950, to 3,776,000 people, which is still growing at a steady annual rate of approximately 1% (Cape Town Population, 2018). These two pressures running parallel have brought many issues within the Cape Town Water Supply System (CTWSS) to the forefront, such as the over reliance on single bulk water sources (e.g dams), the leaking of outdated distribution pipes and the overconsumption of water in the city. It is clear however, that these individual issues can be solved through a variety of solutions including desalination technology, leak detection technology and smart meters.

Cape Town has implemented many of these solutions and it is said that the city has relatively good water saving technologies now in place (Muller, 2017). Due to this, day-zero¹ has been delayed multiple times from May 2018 to August 2018 and now to 2019 (Stoddard, 2018). In this sense, progress is being made. However, many solutions are being implemented as short-term crisis alleviation solutions and not necessarily for long term water security. This is especially evident with desalination plants, which are currently being used as rapid short-term solutions to the water scarcity problems, implemented by private companies and with a contractual running time of approximately two years (Zyl, 2018). Despite this, desalination is seen as "the only truly climate resilient source of water that is independent of rain" by the governmental actors of Cape Town (DWS & City of Cape Town, 2018, p. 2) and is proposed to contribute a large part of the diversification of water sources in the above cited Water Outlook report. However, the success of this depends on the development of the technology and whether the governance context is supportive of long-term sustainable desalination implementation. The latter will be the main focus of this research and report.

¹"The City of Cape Town describes Day Zero as the point at which the Disaster Risk Management Centre introduces phase 2 of its plan. Phase 2 will be triggered when the city's big six dams supplying Cape Town reach a storage level of 13.5%. This leaves just enough water to supply critical services." (Winter, 2018).

1.2 Desalination overview

Worldwide, desalination technologies are already being used by countries that struggle with very dry seasons and water scarcity in coastal regions, most notably in Israel (Talbot, n.d.). In Israel, desalination of seawater is seen as a complementary long-term water source to rainwater catchment and groundwater. In SA however, although several desalination plants are already running, they are very small, not as technologically advanced as those in other countries and only serve to supply a nearby area or buildings (e.g. Hotels, Private Health Clinics etc.). Furthermore, there are many sustainability issues and technological limitations with current desalination in Cape Town due to the rudimentary technology being used which will be briefly summarised (Ackfeld, Meyer and Van Donkelaar, 2018).

Firstly, the intake of marine organisms with the input seawater into the desalination systems is an environmental concern (Missimer, 2018). Secondly, Roberts, Johnston and Knott (2010) suggest that the discharge of desalination plants has a negative effect on temperature and salinity of the ocean water, which bear risks for local flora and fauna of the sea (Miller, Shemer & Semiat, 2015). Lastly, the most common desalination technique in SA is seawater reverse osmosis (SWROs), which uses fossil fuels and is energy intensive. In South Africa fossil fuels are the dominant source of energy supply (Department of Energy, n.d.). For this reason, desalination contributes largely to the emission of CO2, a major contributor to climate change. Finally, the use of fossil fuels also increases SAs dependency on fossil fuel rich countries (Schyns, Hamaideh, Hoekstra, Mekonnen & Schyns, 2015).

Therefore, although desalination technology has potential to contribute largely to the water supply mix and to the crisis alleviation, these limitations² deserve considerable attention to prevent wholly short-term unsustainable implementation of desalination plants. Although the short-term mind-set is understandable due to the severity of the crisis, it is of importance that the governance context remains also focussed on the long-term. In light of this, the question of whether the governance context is, supportive of the sustainable implementation of desalination plants or simply the short-term crisis alleviation shall be investigated within this research.

"A water crisis is usually a crisis of governance." - Charbit (2011)

² These technological limitations along with proposed solutions, are further explored and discussed by Ackfeld, Meyer and Van Donkelaar (2018), another sub-group of this research project, which can be supplied upon demand.

2. Framework & Methodology

2.1 Theoretical Framework

As an academic who is external to the context in question, it is of utmost importance to consider and understand the governance context surrounding a proposed policy or project implementation such as desalination, before making any recommendations. As explained by Ostrom (2007), it is very often the case that academics propose panaceas in the form of formal governance models which are insensitive and unsuited to the context in question, resulting in the failure of many previous governance restructurings. This is even more true in the case of Cape Town, whereby the system is fragile due to the recent state of crisis. Therefore, the dynamic network of actors within the Cape Town water governance system who are forming and implementing different policies across levels and scales must be understood (Bressers & Lulofs, 2010).

Due to this contextual approach taken for this report, The Government Assessment Tool (GAT) is used for this analysis. The GAT is derived from Contextual Interaction Theory (Bressers, 2004; Bressers, 2009; De Boer & Bressers, 2011), which highlights that the context in which governance interactions take place when implementing a policy are of utmost importance to the outcome. The context in question is therefore defined through specific qualities and dimensions of governance, which can be translated into interview questions and evaluated as restrictive or supportive of the policy in question (Bresser et. al, 2013).

The categories and criteria are seperated in two sets. Firstly, there are the five dimensions of governance: levels and scales; actors and networks; problem perspectives and goal ambitions; strategies and instruments; and responsibilities and resources. Secondly, there are the qualities of the governance context: extent; coherence; flexibility and intensity. By assessing these categories and qualities in a 5x4 matrix, it is possible to form a deeper understanding of the governance context surrounding the desalination implementation and in turn propose more context suitable and pragmatic governance solutions. An outline of this matrix and the questions which arise at the intersection of each dimension and quality of governance can be seen in [Table 1].

Governance Dimension	Extent	Coherence	Flexibility	Intensity
Levels &	How many levels are	Do these levels work	Is it possible to move	Is there a strong
scales	involved and dealing	together and do they	up and down levels	impact from a certain
	with an issue? Are	trust each other	(upscaling and	level towards
	there any important	between levels? To	downscaling) given	behavioural change
	gaps or missing	what degree is the	the issue at stake?	or management
	levels?	mutual dependence		reform?
		among levels		
		recognised?		
Actors &	Are all relevant	What is the strength	Is it possible that new	Is there a strong
networks	stakeholders	of interactions	actors are included or	pressure from an
	involved? Are there	between	even that the lead	actor or actor
	any stakeholders not	stakeholders? In	shifts from one actor	coalition towards
	involved or even	what ways are these	to another when	behavioural change
	excluded?	interactions	there are pragmatic	or management
		institutionalised in	reasons for this? Do	reform?
		stable structures? Do	the actors share in	
		the stakeholders	'social capital'	
		have experience in	allowing them to	
		working together? Do	support each other's	
		they trust and	tasks?	
		respect each other?		
Problem	To what extent are	To what extent do	Are there	How different are the
perspectives	the various problem	the various	opportunities to	goal ambitions from
& goal	perspectives taken	perspectives and	reassess goals?	the status quo or
ambitions	into account?	goals support each		business as usual?
		other, or are they in		
		competition or		
		conflict?		

Table 1: GAT Matrix (Bresser et al., 2013)

Strategies &	What types of	To what extent is the	Are there	What is the implied
instruments	instruments are	incentive system	opportunities to	behavioural deviation
	included in the policy	based on synergy?	combine or make use	from current practice
	strategy? Are there	Are trade-offs in cost	of different types of	and how strongly do
	any excluded types?	benefits and	instruments? Is there	the instruments
	Are monitoring and	distributional effects	a choice?	require and enforce
	enforcement	considered? Are		this?
	instruments	there any overlaps or		
	included?	conflicts of incentives		
		created by the		
		included policy		
		instruments?		
Responsibili	Are all responsibilities	To what extent do	To what extent is it	Is the amount of
ties &	clearly assigned and	the assigned	possible to pool the	allocated resources
resources	facilitated with	responsibilities create	assigned	sufficient to
	resources?	competence struggles	responsibilities and	implement the
		or cooperation within	resources as long as	measures needed for
		or across institutions?	accountability and	the intended change?
		Are they considered	transparency are not	
		legitimate by the	compromised?	
		main stakeholders?		

2.2 Methodology

In order to answer the questions outlined in Table 1, a literature review of academic papers, news articles and other related sources was conducted, as well as questionnaires with relevant stakeholders within the Cape Town government context in the month of May 2018.

The literature review consisted of researching and reviewing news articles of different political actors and interviews with governmental stakeholders. Furthermore, local opinions, international media articles were also included. Finally, academic papers and their perception of reasons and solutions to the water crisis were considered. From this literature review a background of the Cape Town water governance context was established, as well as a more in-depth analysis to compliment the questionnaire results for answering the questions of Table 1.

Regarding the questionnaires [Appendix A], the questions of Table 1 were translated into a relevant format for this case through group discussions and feedback from our supervisor Dr. Cesar Casiano Flores. These questionnaires were then forwarded to the relevant stakeholders through email and conducted online using Google Forms. However, due to the short time limit of this study, only two questionnaires were feasible for participants to fill out. The stakeholders involved were *the Western Cape Department of Environmental Affairs and Planning* and *the DWS national office*. On top of this however, we received informative replies in the form of statements from a researcher of the University of Johannesburg and a second representative of DWS national, which helped further frame our understanding of the governance context.

The following sections will follow the same structure as followed within the methodology description above. Firstly, the general governance context of the Cape Town water supply system which was derived from the literature review will be outlined to the reader in the case description. Following this, a qualitative analysis of the context will be conducted using the results from both the questionnaires and the more in-depth literature review. This will be concluded by a discussion and conclusion of the most noticeable issues pertaining to the implementation of desalination projects in Cape Town.

3. Case description

Over the past decades, SA has adopted a complex decentralised water governance landscape. In doing this, SA showcases policy commitments including perspectives from all major stakeholders which spreads power vertically, compared to the preceding hierarchical structure (Beck, Rodina, Luker & Harris, 2016) and thereby affects how decisions for the implementation of new water resources such as desalination are made.

This attempt to decentralise water management has its roots in the history of the relatively young South African democracy. The strong racial segregation in the second half of the twentieth century affected the water supply system and therefore, in the 1990s, several legislations were put in place to countermand injustices of the right and access of water for the entire population (Beck et al., 2016). Many of these were crucial for the progression of the current water supply system. The White Paper on a National Water Policy 1997 defined three fundamental principles for managing water resources, namely efficiency, equity and (environmental) sustainability (South Africa Yearbook, 2014). Furthermore, the National Water Act which redefines water rights and was key in promoting an integrated water resource management³ (IWRM) (Water and Sanitation Program, 2011) was adopted amongst others in the Olifants-Doorn area, Western Cape (South Africa Yearbook, 2014). IWRM is an approach to include multiple disciplines and participatory perspectives in the management of water resources such as desalination. Decision-making is spread as to increase transparency and public needs and interests are better represented easier accessible. This IWRM system was realised through ensuring the water supply in SA from three main levels, namely; the national level, the provincial level and the regional level (Mokoena, 2015). Figure 1 below illustrates this decentralised water management system.



Figure 1 (Weaver, O'Keeffe, Hamer & Palmer, 2017)

At the *national level*, the Department of Water and Sanitation (DWS), currently lead by Minister Gugile Nkwinti, is the main governmental body responsible for setting water policy and regulations. Furthermore, the DWS owns some of the large water dams and is commissioned to plan and implement water resource development projects under which also desalination projects fall (DWS, 2015). Furthermore, the DWS is responsible for regulating and controlling water use, primarily for the agricultural sector (DWS & City of Cape Town, 2018). On top of that the responsibility of the DWS stretches to provincial and local level. Through nine regional offices (DWS-RO), technical and managerial

³ "IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (Global Water Partnership, 2012). It promotes the role of local governments who are "in touch with community needs, more empowering, more effective in cooperative practices, and more cost-efficient than "higher" scales of governance" (Norman & Bakker 2009, p. 103).

operations of stakeholders throughout the water cycle are monitored and national policies are implemented, monitored and enforced (DWS, 2015). Furthermore, the regional DWS office is also responsible for the authorisation of water use licences in the province of Western Cape, as well as the oversight of municipal Water Services Development Plans (WSDP) and the allocation of the Regional Bulk Infrastructure Grants, which fund projects such as new treatment plants, reservoirs etc. in the CTWSS (DWS, n.d.). Therefore, although DWS is a national governmental entity, they have many responsibilities at all levels of the water management system and play therefore a major role for the successful implementation and realisation of desalination projects.

At the *provincial level*, state-owned and area specific water boards, are tasked with bulk water supply and the running of some wastewater treatment plants and retail services (DWS, n.d.). They are overseen by the minister of the DWS and provide water to water service authorities (WSA), such as the municipality of Cape Town. In the CTWSS, 99% of the fresh water is supplied by six lakes that fall under the operational maintenance of the Overberg water board in the Western Cape (City of Cape Town, 2018). However, responsibilities beyond the bulk water supply end of the CTWSS, fall under the local municipality. What is more, as the white paper on national water policy from 1997 demands, SA has to establish catchment management agencies (CMAs), as primary stakeholders in each of the nine water management areas, roughly divided over the provinces. This is to increase the involvement of local communities in the decision-making processes and outsource water management to more specific geographical contexts. The CMAs report back to the DWS, and the minister of the DWS is ultimately accountable for the effective functioning of the CMAs (DWAF, n.d.). The CMAs can delegate tasks to water boards, but are also directly involved at local level by considering civic opinion, concerns and input through Catchment Management Forums (CMF) and Water User Associations (WUA). From the originally nine planned CMAs only two exist and where they are missing, DWS-RO are acting in their place instead.

At the *regional level*, the WSAs are responsible for ensuring and overseeing an effective distribution, retail, consumption and treatment of water within their area. They are tasked with developing a five-year WSDP, which must be updated on an ongoing basis and submitted annually to the DWS. This plan could for example define how and what infrastructure is planned, implemented and operated in order to provide effective, affordable and sustainable water system to the user (DWS, 2015). Often WSAs are also water service providers, however, if for example wastewater treatment is a regional challenge, this responsibility can be outsourced to bulk water services providers (DWS, 2015). Furthermore, consumers can get involved through WUAs, which are also controlled by the minister of the DWS. Via CMF user can get directly in touch with people from the government and voice their ideas and concerns (Matiwane, 2012), which is especially in the case of desalination projects important, as it is

a new technology that is not necessarily accepted and approved by everyone.

The above illustration of the government context is to realise that there is a division of tasks throughout the CTWSS, however, with the national governmental body of DWS being involved at most levels as well as some responsibilities overlapping with other entities there is still remonance of the hierarchical structure which existed pre 1990s. It is believed, that a successful identification and mitigation of incoherence between certain stakeholders could have a positive effect on the functioning and efficiency of the whole integrated water management system of SA and consequently on the government's ability to effectively realise desalination processes alongside other measures that benefit the mitigation of water scarcity. Therefore, this research aims to assess the governance of the current water system to identify which relationships contribute to its inefficiency in order to identify a solution. For this, the main stakeholders and their mutual relationships are explored to provide a base for the further analysis.

4. Governance Assessment of the Context

The governance assessment results derived from the literature review and questionnaires are presented below.

4.1 GAT - Levels and Scales

The extent of the national, provincial and regional levels of government are all involved in the implementation of desalination plants. The main involved levels are the national *DWS*, the provincial *Western Cape Department of Environmental Affairs and Development Planning* including the *Disaster Risk Management Centre*, the *City of Cape Town* and the *DWS Regional Cape Town Office* who meet monthly to discuss the implementation of new desalination projects. Although it does not seem like gaps exist within the involved levels, there is a stronger impulse from certain levels as well as conflicts in the responsibilities of levels in the crisis versus in the regular governance situation, which will be discussed further in the relevant paragraphs.

Furthermore, all levels are generally coherent and work together, resulting in mutual respect and recognition of dependence between levels, especially due to the severity of the current crisis. Monthly meetings are held between levels and more frequently if deemed necessary, whereby proposals and queries can be brought to the forefront. One of the most fundamental enablers of coherence between levels of governance for the crisis has been the Disaster Operations Centre (DOC) (City of Cape Town, 2018). Furthermore, a related project which the levels work actively together on is the IWRM scheme as discussed in section 4, which further builds trust and cooperation between the levels.

Regarding how flexible the levels are, there seems to be no opportunity to move between levels of governance in a pragmatic manner as roles and responsibilities of levels are defined within the legislative papers, frameworks and acts put in the place in the 90s such as The Water Service Act. However, there seems to be slightly more flexibility in delegating responsibilities to different levels due to the crisis.

Regarding the intensity of the levels, although (as previously outlined in section 4) the national department of DWS are constitutionally responsible for strategic water resource planning and funding under the Water Service Act, the responsibility of commissioning and funding the construction of desalination plants now falls under the City of Cape Town due to the crisis situation (Evans, 2018; Whittles, 2018). Therefore, during the crisis the *City of Cape Town* have the strongest impulse toward behavioural change. However, this has only come due to the recognition of Cape Town as a disaster region and without this recognition and the allocation of the budget from DWS this intensity from the *City of Cape Town* would not be possible. This dependency on the national level has been seen to be problematic in light of the crisis and will be discussed further in the latter sections.

4.2 GAT - Actors and Networks

As well as the government, private actors are also largely involved in the process of implementing and running desalination projects. The construction and operation of desalination plants is contracted out to companies (e.g. Veolia) (Slater, 2017) and the water is usually bought back from these companies by the government or by the private sector. These actors include private health facilities, mining companies, hotels and high water demanding businesses. However, it is noted that NGOs are largely discluded (Mabhida, 2017). For example Mvula Trust one of the largest NGOs supporting water and sanitation in South Africa (The Mvula Trust, n.d.) does not seem to be involved with the implementation of desalination projects. According to an interviewee, these actors have the opportunity to register as '*Interested and Affected parties*' through the environmental authorization process, however, no information could be found of this process within the literature. Therefore, the question of how difficult this authorization is for NGOs with smaller revenue streams and problem perspectives which are regarded as less important by involved actors is unknown to the authors. If it is

overly difficult, it may affect the inclusion of relevant NGOS and societal actors who are non-profit (e.g civic, environmental and research) in the planning, construction, operation and monitoring of such plants.

Despite the lack of inclusion of some relevant actors, the interaction between involved actors is seen as good as they have monthly meetings and institutionalised structures such as the DOC. Furthermore, through the establishment of the Emergency Water Augmentation Environmental Monitoring Committee (EWAEM) which contains representatives from all governmental levels and monitors new supply projects, actors are offered a platform to exchange information. However, once again this interaction seems to be due to the crisis situation, therefore it is not reflective of regular governance. Previous interactions especially between the Western Cape and the national Government speak of large tensions that might still underlyingly inhibit mutual trust and courtesy (e.g. Zille, 2017). Furthermore, experience of the government and the involved actors working together outside of this is not evident. Therefore, it seems that there is mutual respect and recognition of dependence between actors, however, this seems to be mostly due to the crisis situation.

As outlined previously, flexibility is limited due to procedures being based on the National Water Act and the National Environmental Act. However, due to the crisis it seems that flexibility for actors has improved to a moderate state. The *City of Cape Town* has taken on a leading role in commissioning and funding new water supply projects which it would have not have been enabled to do previously due to the above mentioned reason. Furthermore, there is apparently room to include new actors through the environmental authorization process, although the effectivity of this is questionable. Finally, there is evidence that intra-governmental social capital is shared as The City of Cape town and the DWS write many reports on the future of the CTWSS together (e.g. the Water Outlook 2018 Report for Cape Town, 2018), however, this does not go beyond the governmental sphere to other actors.

The *City of Cape Town* and the desalination companies have the largest impulse for change as they are the most involved in the planning, construction, operation and monitoring of desalination projects. However, this once again depended on the recognition of the disaster and budget allocation from DWS national.

4.3 GAT - Problem Perspectives and Goal Ambitions

Due to monthly meetings, the DOC and the EWAEM it can be assumed that all problem perspectives of the involved levels and actors are taken into account in one way or another.

Furthermore, although the problem perspectives and goal ambitions of non-profit NGOs are not directly accounted for in the implementation process, they are indirectly considered through the provincial level of governance who interrogates the available research and reports on the subject to inform decision-making and management in the implementation process.

The coherence of problem perceptions and goal ambitions seem to fluctuate as the perceived severity of the crisis does. According to the literature, the national government perceived desalination as a viable water source for the future which is evident from the roadmap and strategies developed by Cape Town and the DWS (DWS & City of Cape Town, 201; Blersch, 2014). However, due to the crisis short-term goals and responsibilities of the private sector and the government to supply water, have lead to the unsustainable implementation of desalination technology with two year contractual running times (Zyl, 2018). Therefore, the goals and problem perspectives of involved actors are now relatively coherent due to the severity of the crisis and the recognition of the need to supply water through any means possible. However, once again the problem perspectives and goals of actors who are not included are unknown and indirectly taken into account through research by the provincial actor. Regarding the *Western Cape Environmental and Development Planning*, their environmental problem perceptions may also sometimes clash with the more social welfare and business oriented goals of the other governmental actors and the private sector.

As seen within the previous sections many procedures are defined by legislation and therefore flexibility in regard to goal ambitions and problem perceptions is limited. However, it is seen that there is the opportunity to reassess goals regarding new emerging problems due to the crisis. An example of this is how the government's previous aims to: increase public awareness and acceptance of desalination technologies; and reduce the limits put on desalination plants for environmental, societal and economic concerns, have now been less prioritised to enable the implementation of short-term desalination technologies to supply emergency water (Burnell, 2017; DWA, 2013). Furthermore, both questionnaire respondents stated that the goals of the projects can be reassessed to fit new needs of involved actors. Therefore, flexibility in the crisis situation is moderate.

The goals regarding desalination in the National Water Resource Strategy 2013 and the Water Outlook Report for Cape Town 2018 are ambitious and undoubtedly go beyond business as usual regarding the implementation of desalination projects. However, due to the crisis and the evolving problem perspectives, the goals have now been revised into more short-term alternatives which are even more intensely followed than previous. There is a strong pressure from the national and regional levels to supply water to Cape Town which encourages a stronger environmental response from the provincial level.

4.4 GAT - Strategies and Instruments

The national and regional government have legal strategies in place to implement desalination projects, not only as a short-term solution for the crisis but also as a long-term opportunity for water security. Firstly, desalination is aimed to be implemented alongside other technologies such as groundwater. Secondly, it is recognised that different contexts and scales will need different desalination plant sizes and technologies. Thirdly, different actors are aimed to be included. Only recently Cape Town released a call for information to parties to submit "possible solutions to augment the city's potable water supply by using reverse osmosis, desalination or similar plants to produce between 100 to 500 megalitres of potable water per day from the sea water, other surface water resources or even treated run-off" (Burnell, 2017). It seems, one strategy is also to increase information input and pool resources. The DWS plans on cooperating with many other departments such as the Department of Energy (DOE), the Department of Public Enterprises (DPE) to make more long-term planning for energy and water resources. For this also Eskom, a SAn electricity provider is included in the discussion. To develop desalination technologies, the DWS wants to cooperate with the Water Research Commission (WRC), the Department of Science & Technology (DST), the Department of Trade & Industry (DTI) and the private sector. Furthermore, focus is also put on the training of competency of people involved in the management, engineering, operation and maintenance of desalination projects (DWA, 2013). However, it seems unclear how these processes are monitored.

The strategies of different actors are well aligned and due to the urgency of the situation, progress seems to be made (several desalination plants went online in 2018). However, there are issues complying with previous environmental impact regulations and the National Environmental Management Act. These require that the environmental, social and economic effects of a proposed desalination plant need to be assessed and reported for approval. Due to the current emergency situation it is suspected that plants are implemented without careful consideration of its long-term effects (Burnell, 2017).

The different approaches that were outlined can be well combined as they are directed at very different areas. For example, more stakeholder involvement and consultation, inclusion of private sectors and normal citizens are not exclusive to improving the managerial capacities of project leader and plant operation staff. However, the actual reality of these strategies in practice is unknown to the authors

The strategies outlined seem to serve the accomplishment of the ambitious goals mentioned earlier given the severity of the crisis. It can be noted that the strategies are therefore aimed to go beyond business as usual. The intended strategies are well adjusted to this situation, however, due to a lack of information, it can not be assessed to what extent these strategies are implemented and execute the ambitious goals set.

4.5 GAT - Responsibilities and Resources

In light of the crisis, it was not clear who could be held responsible for the water situation. Therefore, two of the main actors, namely, the Western Cape and national government initially blamed each other as reported by Koyana (2017). Furthermore, due to the ongoing attempt at establishing the IWMR, the DWS acts on responsibilities which on paper are the responsibilities of the IWRM bodies. Furthermore, the City of Cape Town did not seem equipped with the necessary managerial and technical skills to handle their responsibilities and serious issues arise concerning the monitoring and reporting on water service compliance and performance (Water and Sanitation Program, 2011). However, currently as the DOC and the EWAEM have been established and all actors have come together to deal with the crisis, responsibilities are more clearly assigned to involved actors and the resources are available to deal with them. Regarding the Western Cape however, some resources have had to be prioritised in specific areas for the crisis and away from the usual areas of allocation.

The actors state that there are no contradictions with other responsibilities. However, it is assumed that responsibilities of environmental regulators such as the provincial actor can sometimes contradict those to supply water to the population, especially regarding the environmental risks of reverse osmosis desalination plants as discussed previously. Furthermore, at the beginning of the crisis it is evident that the City of Cape Town was put under pressure to reallocate budget due to the lack of national recognition and funding for the water crisis as discussed previously. This resulted in the responsibilities to develop water infrastructure and services being put on hold to deal with the short-term crisis.

Once again, as seen within the previous sections many procedures are defined by legislation and therefore flexibility in regard to goal ambitions and problem perceptions is also limited. However, the crisis has resulted in many of the responsibilities of actors being redistributed. For example, as mentioned previously the mandate to plan new water resources as defined in the Water Services Act has been delegated to the *City of Cape Town*.

Due to the crisis situation and funding from the National Disaster Management Centre, the allocation of resources to desalination plants is high and they are sufficient to supply water for the short-term crisis. However, these funds are not allocated in the appropriate way to build large desalination plants, more to build more small scale and short-term.

5. Summary of findings

Following this analysis of the governance dimensions and qualities, extent, coherence and flexibility are assessed as low to moderate; and intensity is assessed as moderate supportive in light of the crisis. This generally causes quite some restrictions for implementing desalination plants in a sustainable manner, however, it is achieving the short-term goals of supplying water for the short-term crisis. The crisis has been seen to bring actors and levels relatively closer together, aligning their problems, goals, strategies, resources and responsibilities relatively better. Below these the Cape Towns position on these qualities will be further discussed.

Extent was assessed as low to moderate, therefore somewhat restrictive. The involvement of the national, provincial and regional level of governments as well as relevant companies from the private sector in the implementation of desalination plants is moderate. However, the imbalance of power within the governmental actors due to the lack of involvement of NGOs and a large reliance on DWS national, the extent is assessed as moderate to low. Furthermore, it seems that the crisis situation has lead to the involvement of members of the private sector, which does not seem to be practiced outside of the crisis situation which will be discussed further later. Due to this the problems perspectives and goals of all involved actors seem to be currently taken into account from top-to-bottom, scaling from the most powerful actor, namely, DWS national, to the uninvolved societal representatives and NGOs such as Mvula.

Coherence was assessed as low to moderate, therefore somewhat restrictive. There is moderate coherence due to the severity of the crisis situation leading to programmes such as the DOC. This has enabled the levels of governance to trust each other and recognise their mutual dependence. This moderate coherence also stands for the alignment of goal ambitions and problem perceptions of involved actors and levels of government, which seems to have improved with the increased severity of the crisis. However, due to the non-inclusion of societal actors and NGOs, as well as the more long-term goals and responsibilities of the *Western Cape Environmental and Development Planning* and *the City of Cape Town* being put aside for the short-term crisis alleviation, there are trade-offs being made and conflicts between long-term and short-term goals are emerging, leading to low coherence.

Flexibility was assessed as low to moderate, therefore somewhat restrictive. The bases of all procedures follow legislation such as the National Water Services Act and The National Environmental Act, which restricts the flexibility of all actors and levels of government. However, there are positive developments such as the sharing of social capital between DWS and the City of Cape Town and the DOC which allows for monthly meetings of involved actors to align and re-align goals of projects. Once again, this improved flexibility seems to be a temporary state of the crisis and therefore it is questionable whether this will remain following the alleviation of the crisis.

Intensity was assessed as moderate and therefore supportive. Intensity toward the implementation of desalination plants is moderately supportive due to all actors recognition of the severity of the crisis. The City of Cape Town have the strongest impulse in this instance as they currently fund, commission and oversee the implementation of the desalination plants through the funds they get from DWS as they are now classified as a disaster region.

Dimensions of governance	Qualities of the governance context			
	Extent	Coherence	Flexibility	Intensity
Levels & Scales	Moderate	Moderate	Low	Moderate
Actors & Networks	Low	Moderate	Moderate	Moderate
Problem perspectives & goal ambitions	Moderate	Low	Moderate	Moderate
Strategies & instruments	Moderate	Moderate	Low	Moderate
Responsibilities & resources	Low	Low	Low	Moderate

Table 2: Results of Assessment

Assessed as:	Low to moderate	Low to moderate	Low to moderate	Moderate
				supportive

6. Discussion

Regarding regular governance beyond the crisis, Lemos and Agrawal (2006) argued that a complex network of stakeholders at the national and regional level could cause in theory a more efficient allocation of resources through involving the relevant actors with the responsibility of managing their own water supply. However, with many varied interests, responsibilities, resources and problem perceptions, outsourcing the decision-making process to many individual entities and fostering mutual dependence gives opportunity for miscommunication, disagreement and poor implementation of policies in practice (Charbit, 2011). Therefore, although the water management system in SA is decentralised in theory and institutions on all levels and scales are in place (e.g. catchment management forums, water user associations), in practice the decision-making impulse is still centralised around the DWS, which, as of now, does not allow SA as a whole yet to benefit from the increase of efficiency and high stakeholder involvement and power balance that it IWRM promised. This coupled with the fact that only two out of nine CMAs have become actionable raises the question whether IWRM is the correct management structure to pursue or should a more context appropriate structure be formulated (Giordano & Shah, 2014).

Regarding the governance during the crisis, there is a short-term urgency to become more extensive, coherent, flexible and intensive by all dimensions of governance in implementing desalination plants. This is done through involving more stakeholders, fostering more transparent communication as well as delegating and pooling resources and responsibilities. Therefore, the crisis is enabling positive aspects of governance to emerge, however, the short-term efficiency of action-taking is problematic when correct precautions are not taken, leading to no genuine will and organisation to enable water security beyond the crisis. In light of this, many underlying conditions such as trust and mutual dependence which are necessary for a well-functioning government are lacking beyond the crisis.

Furthermore, this hasty reaction to the water crisis has also led to the involvement of private sectors, which does not seem to be common practice outside of the water crisis. Although the strategies and instruments on paper highlight large stakeholder involvement, it is questionable whether this happens in practice. As we've seen NGOs and civic and environmental actors have been left out.

Therefore, it is advised that the collaboration of actors and levels of governance as well as the inclusion of now discluded members such as civic, environmental and research NGOs is taken as an approach of governance by South Africa beyond the crisis.

Furthermore, the crisis has stimulated the establishment of additional committees such as the DOC and EWAEM, which seem to make the planning, operation and monitoring processes of desalination projects even more unclear. Besides, desalination is, although of major interest, only one water resource technology. However, it is also associated with lots of risks and high capital investments and energy intensity. Therefore, the question arises why the construction of desalination plants for a period of two years is encouraged rather than promoting groundwater and rain catchment primarily which are much cheaper (Whittles, 2018).

7. Conclusions

To conclude, it can be said that Cape Town's water governance is learning from the current crisis. Currently, SA showcases effective action-taking and implementation of desalination plants as an alternative water resource that is climate independent. However, conditions for a genuinely well-functioning governance are found to be lacking which constraints the effective operation of the desalination plants beyond the crisis. Main problems were found to be in the problem perceptions and clarity of responsibilities between stakeholders. Furthermore, although a decentralisation of decision-making is legally intended and captured, problems arise with the power being very centralised around the DWS.

Therefore, although short-term crisis alleviation desalination technology is currently being prioritised over long-term sustainable water security solutions, positive aspects of governance have been manifested, such as policy intensity, collaboration, trust, recognition of mutual dependence as well as resource and responsibility delegation, pooling and flexibility. Therefore, it is recommended for SA to adopt these positive aspects of governance which are seen during the crisis into the regular governance beyond the crisis. However, this must be coupled with intense collaborative planning, construction, operation and monitoring of involved actors to ensure the economic, social and environmental sustainability of desalination projects.

8. References

- Ackfeld, J., Meyer, P. P. & Van Donkelaar, F. (2018). Sustainable Desalination as a Water Source for the Western Cape. A Consultancy Report. Retrieved from: https://www.overleaf.com/16077236swrftfwxbkzy#/61409336/
- Beck, T., Rodina, L., Luker, E., & Harris, L. (2016). Institutional and policy mapping of the water sector in South Africa.
- Blersch, C. L. (2014). *Planning for seawater desalination in the context of the Western Cape water supply system* (Doctoral dissertation, Stellenbosch: Stellenbosch University).
- Bressers, H. (2004). Implementing sustainable development: how to know what works where when and how. In: Lafferty WM (ed) Governance for sustainable development: the challenge of adapting form to function. Edward Elgar, Cheltenham Northampton, pp 284–318
- Bressers, H. (2009). From public administration to policy networks. Contextual interaction analysis. In:
 Stéphane, N., & Varone, F. (eds) Rediscovering public law and public administration in
 comparative policy analysis. A tribute to Peter Knoepfel. Presses polytechniques, Lausanne, pp
 123–142
- Bressers, H, & Lulofs, K. (eds) (2010). *Governance and complexity in water management. Creating cooperation through boundary spanning strategies*. Edward Elgar, Cheltenham
- Bressers, H., de Boer, C.; Lordkipanidze, M.; Ö zerol, G.; Vinke-De Kruijf, J.; Furusho, C.; Lajeunesse, I.;
 Larrue, C.; Ramos, M.; Kampa, E.; Stein, U.; Tröltzsch, J.; Vidaurre, R.; Browne, A. (2013). Water
 Governance Assessment Tool: With an Elaboration for Drought Resilience; CSTM: Enschede,
 University of Twente

Burnell, M. (2017, August 22). Desalination an option, but we need a clear strategy for water supply. The steps required include assessment of management and upgrading of resources and infrastructure. Retrieved from: https://www.businesslive.co.za/bd/opinion/2017-08-22-desalination-an-option-but-we-need-aclear-strategy-for-water-supply/

Cape Town Population. (2018). Retrieved from:

http://worldpopulationreview.com/world-cities/cape-town-population/

Charbit, C. (2011). Governance of public policies in decentralised contexts: The multi-level approach. *OECD Regional Development Working Papers*, 2011(4), 1. Retrieved from: https://www.oecd.org/governance/regional-policy/48724565.pdf

- City of Cape Town. (2018). Water Services and the Cape Town Urban Water Cycle. Retrieved from: https://resource.capetown.gov.za/documentcentre/Documents/Graphics%20and%20education al%20material/Water%20Services%20and%20Urban%20Water%20Cycle.pdf
- City of Cape Town. (2018, January 27). Activation of Disaster Operations Centre. Retrieved from: http://www.capetown.gov.za/Media-and-news/Activation%20of%20Disaster%20Operations%2 0Centre
- De Boer C., & Bressers, H. (2011). *Complex and dynamic implementation processes. Analyzing the renaturalization of the Dutch Regge river*. University of Twente and Water Governance Centre, Enschede
- Department of Energy. (n.d.). *Coal Resources*. Retrieved from: http://www.energy.gov.za/files/coal_frame.html
- Department of Water Affairs. (2013). National Water Resource Strategy: Water for an Equitable and Sustainable Future. Pretoria: Department of Water Affairs, South Africa.
- Department of Water Affairs and Forestry. (n.d.). The Catchment Management Agency as an Organization. *CMA and WUA Guide series Guide 2.* Retrieved from:

http://www.dwaf.gov.za/cma/documents/CMAGuide2ver4.pdf

- Department of Water and Sanitation. (n.d.). Water Service Institutions. Retrieved from: http://www.dwa.gov.za/IO/wsi.aspx
- Department of Water and Sanitation. (2015). Strategic Overview of the Water Services Sector in South Africa 2015. Retrieved from:

http://www.dwaf.gov.za/Downloads/WS/Macro_Planning_Products/STRATEGIC%20OVERVIEW %20OF%20WATER%20SERVICES/STRATEGIC%20OVERVIEW%20OF%20THE%20WATER%20SERVI CES%202015%20(A6%20Booklet).pdf

Department of Water and Sanitation & City of Cape Town. (2018). *Water outlook 2018 report*. Retrieved from:

https://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%2 0and%20review/Water%20Outlook%202018%20-%20Summary.pdf

Evans, J. (2018, February 1). *Rush to get Cape Town's temporary desalination plants online*. Retrieved from:

https://www.news24.com/SouthAfrica/News/rush-to-get-cape-towns-temporary-desalination-p lants-online-20180201

Giordano, M. & Shah, T. (2014). From IWRM back to integrated water resources management. Retrieved from: https://www.tandfonline.com/doi/abs/10.1080/07900627.2013.851521 Global Water Partnership. (2012). About IWRM. Retrieved from:

https://www.gwp.org/en/gwp-SAS/ABOUT-GWP-SAS/WHY/About-IWRM/

Koyana, X. (2017). DA and ANC trade blows over Western Cape water crisis. The DA and ANC in the Western Cape are playing a blame game over which party's responsible for the water crisis. Retrieved from:

http://ewn.co.za/2017/03/02/da-and-anc-trade-blows-over-western-cape-water-crisis

Lemos, M. C., & Agrawal, A. (2006). Environmental governance. *Annual review of environment and resources*, *31*. Retrieved from:

https://pdfs.semanticscholar.org/8d6b/2568f0178bc1899772c4ce43dbe2b29cefc1.pdf Mabhida, M. (2017). Learning notes. Intra Africa Desalination Round Table. *"The Beginning of a Journey"*.

Retrieved from:

http://www.mile.org.za/Come_Learn/Knowledge_Management/Multimedia%20Library/Learnin g%20Notes2017/Desalination%20Learning%20Exchange-Learning%20Note.pdf

- Matiwane, M. (2012). Public participation as governance; The role of catchment forums in water governance. Retrieved from: http://etd.uwc.ac.za/xmlui/handle/11394/3707
- Miller, S., Shemer, H., & Semiat, R. (2015). Energy and environmental issues in desalination. *Desalination*, *366*, 2-8. doi:10.1016/j.desal.2014.11.034
- Missimer, T. M., & Maliva, R. G. (2018). Environmental issues in seawater reverse osmosis desalination: Intakes and outfalls. *Desalination*, 434, 198-215. doi:10.1016/j.desal.2017.07.012
- Mokoena, K. (2015). Decentralisation of water resource management: a comparative review of catchment management authorities in South Africa and Victoria, Australia (Doctoral dissertation, University of Cape Town). Retrieved from: https://open.uct.ac.za/bitstream/item/22565/thesis_law_2015_mokoena_karabo.pdf?sequenc e=1
- Muller, M. (2017). Understanding Cape Town's Water Crisis. Retrieved from: https://ssrn.com/abstract=2995937
- Muller, M. (2018, February 6). South Africa Needs Good Water Management Not New Water Laws. Retrieved from: https://theconversation.com/south-africa-needs-good-water-management-not-new-water-laws -91253
- Norman, E. S., & Bakker, K. (2009). Transgressing Scales: Water Governance Across the Canada–U.S. Borderland. *Annals of the Association of American Geographers*, *99*(1), 99-117.

doi:10.1080/00045600802317218

Ostrom, E., Janssen, M. A., & Anderies, J. M. (2007). Going beyond panaceas. *Proceedings of the National*

Academy of Sciences, 104(39), 15176-15178.

- Roberts, D. A., Johnston, E. L., & Knott, N. A. (2010). Impacts of desalination plant discharges on the marine environment: A critical review of published studies. *Water Research*, 44(18), 5117-5128. doi:10.1016/j.watres.2010.04.036
- Schyns, J. F., Hamaideh, A., Hoekstra, A. Y., Mekonnen, M. M., & Schyns, M. (2015). Mitigating the risk of extreme water scarcity and dependency: the case of Jordan. *Water*, *7*(10), 5705-5730.
- Slater, D. (2017, August 11). Amid growing water worries, desalination option enters SA's supply debate. Retrieved from:

http://www.engineeringnews.co.za/article/amid-growing-water-worries-desalination-option-en ters-sas-supply-debate-2017-08-11/rep_id:4136

South Africa Yearbook. (2014). Retrieved from:

https://www.gcis.gov.za/sites/default/files/docs/resourcecentre/yearbook/2013-4Water_Affair s.pdf

Stoddard, E. (2018). *Cape Town 'Day Zero' pushed back to 2019 as dams fill up in South Africa*. Retrieved from

https://www.reuters.com/article/us-safrica-drought/cape-town-day-zero-pushed-back-to-2019as-dams-fill-up-in-south-africa-idUSKCN1HA1LN

Talbot, D. (n.d.). *Megascale Desalination The world's largest and cheapest reverse-osmosis desalination plant is up and running in Israel*. Retrieved on 24 May 2018, from https://www.technologyreview.com/s/534996/megascale-desalination/

The Mvula Trust. (n.d.). NGO for Water and Sanitation. Retrieved from: http://www.mvula.co.za/

Water and Sanitation Program. (2011). Water Supply and Sanitation in South Africa. *Turning Finance into Services for 2015 and Beyond.* Retrieved from:

https://www.wsp.org/sites/wsp.org/files/publications/CSO-SouthAfrica.pdf

- Weaver, M. J. T., O'Keeffe, J., Hamer, N., & Palmer, C. G. (2017). Water service delivery challenges in a small South African municipality: Identifying and exploring key elements and relationships in a complex social-ecological system. *Water SA*, 43(3), 398-408.
- Whittles, G. (2018, January 18). *Researchers warn 'purified' Cape Town sea water will be contaminated*. Retrieved from: https://mg.co.za/article/2018-01-18-00-sea-water-is-a-health-risk-say-profs

Zyl, W. V. (2018). Desalination: Global examples show how cape town could up its game.

Retrieved on 24 May 2018, from https://theconversation.com/ desalination-global-examples-show-how-cape-town-could-up-its-game-90949

9. Appendix

Appendix A - Questionnaire based on the Government Assessment Tool

The implementation of desalination projects in Cape Town, South Africa

The following questionnaire was designed for a governance research project at the University of Twente, the Netherlands. This project aims to investigate the governance context surrounding the implementation of desalination projects in the Cape Town water supply system, by use of the Government Assessment Tool developed at the University of Twente. This methodological tool is designed to assess how: the levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and the policy instruments which are involved in the implementation of desalination projects, affect their implementation.

Through this questionnaire, the researchers aim to attain a realistic & multi-perspective picture of the current implementation of desalination projects in Cape Town. After evaluating the results the participants will have access to recommendations to assist the implementation of these projects.

The questionnaire contains four sections with 7-8 questions per section and should take approximately 20 minutes. The questions can be difficult to answer, but any insights from your perspective will be valuable.

If a question within the questionnaire is not relevant to your department please indicate why within the answer. Each question refers to 'you' which means 'your department or organisation'.

Below are important definitions of terms used within the questionnaire: Implementation: the planning, operation and monitoring of the project. Desalination projects: private or public & large-scale or small-scale projects which aim to provide water through the desalination process (please indicate what kind of project you referring to).

Contact Researcher: Emily Bankert (<u>e.m.bankert@student.utwente.nl</u>) Contact Supervisor: Cesar Casiano (<u>c.a.casianoflores@utwente.nl</u>)

General information

- 1. Name of department/organisation:
- 2. General responsibilities of department/organisation:
- 3. Is your department/organisation actively involved in the implementation of desalination

projects? If so what are your responsibilities in the implementation?

Section 1: Extent

This section aims to elaborate how extensive the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments which are involved in the implementation of desalination projects are.

4 Which governmental levels are involved in the implementation of desalination projects? Check all that apply.

National - South Africa
 Provincial - Western Cape
 Regional - City of Cape Town
 Local - NGOs and society
 Other:

5. Please list the names of governmental or non-governmental actors involved in the implementation of desalination projects on the different levels:

6. Which of these actors does your department/company meet with to discuss desalination projects?

7. Do you feel any governmental or non-governmental actors which could be relevant are excluded from the implementation of desalination projects ?

8. Do you feel your problems and goals are always considered in the implementation of new desalination projects?

9 Are your responsibilities clear in implementing desalination projects and do you have sufficient resources to fulfill these responsibilities?

10. What policy instruments (e.g subsidies, tax-breaks etc.) are used by the government when implementing desalination projects? Is there any enforcement or monitoring involved in these instruments?

11. If you feel you have any further comments on the extent of the levels of governance, the involved actors, their: goals, problems, resources and responsibilities, or the policy instruments used please write them below:

Section 2: Coherence

This section aims to elaborate the coherence of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments which you outlined in section 1.

12. Do all governance levels (e.g. national, provincial, regional, local etc.) trust and respect each

other and freely share resources on desalination projects (information, available budget etc.) with the others?

13 Are you dependent on governmental or non-governmental organisations from other levels when implementing desalination projects? If yes which ones?

14. Do you work on other (non-desalination related) projects with the actors which you outlined in section 1?

15. Is there a formally defined structure through which you meet with relevant stakeholders to discuss desalination projects?

16. How often does your department/company meet with the actors outlined in section 1 to discuss desalination projects? Check all that apply.

Weekly
Bi-weekly
Monthly
Annualy
Other:

17. Do you feel that your problems and goals regarding desalination projects are similar to those of other actors outlined in section 1?

18. Do you feel that the policy instruments you mentioned in section 1 conflict with any other policy instruments which are imposed on you by the government?

19 Do your responsibilities for implementing desalination projects contradict your responsibilities for other projects?

20. If you feel you have any further comments on the coherence of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments used please write them below:

Section 3: Intensity

This section aims to elaborate the intensity of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments which you outlined in section 1.

21. Which governance level (e.g national, provincial, regional, local etc.) has the most power in implementing desalination projects?

22. Which actors outlined in section 1 have the most power in implementing desalination projects?

23. Do you believe your problems and goals regarding the implementation of desalination projects are different from those usually possessed by other actors?

24 Are all of the policy instruments (e.g subsidies, tax-breaks etc.) in place to ensure the implementation of desalination projects? Are they followed up with sufficient monitoring and enforcement?

25. Is there monitoring and enforcement to ensure you fulfill your responsibilities regarding the implementation of the desalination project?

26. Do you feel you have sufficient resources to implement the required number of desalination plants and infrastructure?

27. If you feel you have any further comments on the intensity of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments used please write them below:

Section 4: Flexibility

This section aims to elaborate the flexibility of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments which you outlined in section 1.

28. Is it possible that power is given to a different governance level (e.g national, provincial, regional, local etc.)?

29 Have you ever included an actor which had never been included before in implementing a desalination project?

30. Do you actively try to delegate or take on responsibilities and resources to support other actors in implementing desalination projects?

31. Once a decision to implement a desalination project has been made, is there an opportunity to change the direction and goals of the project to facilitate other actors problems and goals?

32. Is it possible to combine or make use of different types of policy instruments (e.g subsidies, tax-breaks etc.)?

33. If you feel you have any further comments on the flexibility of the: levels of governance; the involved actors; their: goals, problems, resources and responsibilities; and policy instruments used please write them below: