

# Appendix 1

## Interview Transcripts

Interviewee 1: Mike Muller

Date: 10 May 2018

Time: 11am

Current Profession:

Credentials: Mike Muller is a civil engineer with extensive experience in strategic public and development management. As Director General of the South African Department of Water Affairs and Forestry (1997-2005), he led the development and implementation of new policies, legislation and programmes in water resources and water services. He now undertakes research and works on an advisory basis to promote the contribution of water services and resource management to broader development, from local to global level. He was appointed a Commissioner of South Africa's first National Planning Commission in 2010 and chaired the World Economic Forum Agenda Council on Water Security from 2012 to 2014. Since 2006, Mike has been a visiting Adjunct Professor at the Witwatersrand University Graduate School of Governance where he supervises master's students, teaches occasional courses and undertakes research.

Interview duration: 27 minutes 26 seconds.

1. Thandeka: Good day Prof Muller, thank you for accepting my call. As you know I am currently doing my masters and I'm writing my thesis on urban water governance in South Africa as I explained to you in the email.

Mike Muller: Yes thank you. In the interest of time can we get right into as I have another meeting scheduled at 11:30?

2. Thandeka: Oh of course. Considering the various and widespread definitions of governance, and the widespread belief that the state increasingly depends on organisations to secure its intentions and deliver policies and such, would you then say that the shortfall in water governance in SA is the Department of Water Affairs's (DWA) responsibility, or that of the City of Johannesburg, that being Johannesburg Water (JW), and is it the state's mandate to actually oversee the works of JW or do they operate autonomously and therefore should be able to secure the delivery of accurate governance measures and governance in that sense?

Mike Muller: well you see I don't know what you're talking about when you say governance and you have to be much more specific than that. And just because lots of people write that they don't like what the city does, doesn't mean there's evidence of shortcomings so you would have to define those.

3. Thandeka: Ok so based on the literature I have reviewed, and a few authors do believe that the problems in SA's water problems not only lie in the fact that we are a water scarce country, but the lack of governance.

Mike Muller: Well you're talking about Johannesburg, so I think its useful to be specific. So, what is a particular shortcoming you would consider in Johannesburg? Because if you start with something

specific you can then move outwards. It's very unhelpful to start and say oh governance is a problem without actually saying what is the structural problem or the specific problem that you are guided by.

4. Thandeka: Well first of all, I would like to start with the National Water Act and all the policies structured around water. So, the national water legislation in SA has been lauded as one of the best internationally. So, the execution of the water act and its provisions are what I would like to have a look at.

Mike Muller: well Thandeka you started off correctly saying there is a specific problem in the City of Johannesburg (CoJ), and then you mentioned that now you can't understand the governance problem unless you understand the objective of governance and you can't determine whether the objectives are met unless you've been clear about them and can give an example of where they are not being met. So, lets turn to Johannesburg (sorry I'm going to keep doing that otherwise we'll have a long general discussion and that's not going to help you very much), so what would you say is a shortcoming in Johannesburg?

5. Thandeka: Well service delivery for example and...

Mike Muller: What's wrong with service delivery?

6. Thandeka: The lack of service delivery considering the spatial set up of Johannesburg, stemming from the apartheid spatial planning regime, with the predominantly white suburban areas and the predominantly black townships and squatter camps on the periphery of the city. In the way that they are set up, it makes it quite difficult for municipalities to reach those people and provide the necessary services such as sanitation and potable water.

Mike Muller: Ok, but then are you saying that you believe that people are not getting services in those areas?

7. Thandeka: Yes, but its not that they are not getting the services, they are quite slow in terms of delivery time, compared to your Houghton areas (sub-urban residential area in Johannesburg).

Mike Muller: What do you mean by slow? See Thandeka I'm not being difficult but the point is if you're going to talk about these issues, and I have a lot of difficulty with people who come to me very much like you, they read a few things, they say there's a problem, but when you push them to try and be specific (and I'm not saying this necessarily in your case), they haven't done their homework, they have though through the issue. So, let me just turn it around to and say if you do a search for Gauteng City Regional Observatory and you search under satisfaction of services, do you know which service people are most satisfied with in Johannesburg?

8. Thandeka: Would it be the water and sanitation?

Mike Muller: It is the water. It's got an 80% satisfaction rate and I was surprised to see that they put it right at the top of the survey and there you have it. You know if you say there's a problem and yet the empirical evidence is that there is no problem, or that there's a limited problem, I don't think its helpful to assume there's a problem, because that almost certainly means that you will go looking in the wrong direction to try and understand what's happening.

9. Thandeka: Ok thank you, that is actually very helpful because I'm not looking at it from whether or not there is a problem, I'm trying to understand if the current governance set up

of water in SA and specifically Johannesburg would be sustainable to secure water for the coming generations. Also considering that urban centres such as JHB are expected to absorb about 60% of the growing population in the coming years.

Mike Muller: So, then you would be asking yourself the question what needs to be done to ensure that future populations have water?

10. Thandeka: Yes, and so then provisions such as IWRM and IUWM are a step towards that?

Mike Muller: Well if I told you that those 2 concepts are sort of largely western European concepts of limited value in a developing country context, I would then say cut the slogans, get behind them and try understanding what they mean. I'm just telling you this, I've been telling people for 10 years and the people concerned have usually failed to define what they mean by the functions for instance of IWRM because they have never done it, but they talk about it. Now you are in the happy position that you don't have to explain everything that people tell you. One of the more useful questions you can ask is: what on earth do you mean by this, what is it specifically that you expect organisations to do.

11. Thandeka: Yes, that is actually a question of mine, because of I have written down here that it is a paradigm of the global North and transferring it to the global south is very difficult for various reasons such as economics, power relations, politics, institutional fit. That was going to be my question to you, do you think that these are utopian concepts when looked at in the settings of SA?

Mike Muller: well it's not the institutional setting, if you look at IWRM, as preached by the Dublin Principles and as promoted by European organisations such as the Global Water Partnership. You will find for instance that it doesn't mention in any significant way, the development of water resource infrastructure to enable reliable sources of bulk water to be made available. Now you can have as much integration and as much urban water management as you like, but if you don't have water, sufficient to put into the system, that can then be distributed, you will then have a failed system. And that's in fact what happened in Cape Town (CT) where they concentrated entirely on demand-management and neglected to increase the supply. They have a growing population and now they find that there isn't enough water to go around. So, you know you have a very practical case in CT, where attempts to follow that paradigm failed not because of poor implementation of the paradigm, but because the paradigm was stupid. It says you don't need more water for more people, which you know is fairly obviously incorrect.

12. Thandeka: Well thank you for answering that question, so my next question has to do with the NWA again, and I think it's a very elaborate document where they detail numerous provisions for water management resource management and do you think, for example, that public participation especially at a grassroots level is an aspect that is addressed sufficiently, or in your professional opinion do you think that social learning would conscientise people to the fact that water is a scarce resource considering the positioning of Johannesburg with no actual nearby water resources. Then people should be conscientised to this and encourage development at grassroots levels?

Mike Muller: Well grassroots level will usually if you ask people, will be much more concerned with the immediate availability, delivery of services, and if you go and consult people about what they think about water that will be their preoccupation. The poorer the service the more they focus on their immediate problem. So, I don't know what the challenge is if you want to talk about something that's going to take 10 years to do and will only benefit the next generation and people feel that

they can't get enough water, or they can't afford the water, or the water is not an appropriate quality you will not have a very good conversation with them because that is not their immediate priority. Again, this is one of these cases where the sort of, the theoretical paradigm of academics doesn't stand very well the test of practise because if you look at what happens even in Europe, where some European countries have found that they can't get adequate participation because people really aren't willing to spend large amounts of time to talk about very complicated issues when they have more specific concerns. So, I think the paradigm of participation is questioned very widely, not just in SA, its internationally. What participation should focus on is finding out what people's concerns are. When we look in SA and find that say in Johannesburg, 80% of people are satisfied with services, that maybe their concerned about jobs and housing, that gives you an indication that you should be looking at jobs and housing rather than at water in participative processes. Otherwise frankly you quite irritate people and they tend to be isolated and driven away from participation rather than encouraged because they say participation doesn't address what we are concerned about.

13. Thandeka: Hmm ok, so basically missing their concerns. And so would you then say it's sort of more superficial to them.

Mike Muller: It's not relevant to them and as far as they are concerned it is not relevant to their immediate preoccupations.

14. Thandeka: Ok, and then my next question has to do with sort of informed expert decisions when it comes to the governance of water and considering that throughout the age of planning, spatial planning and water management and such. We've sort of moved from a technical rationale to a more communicative rationale and a lot of people argue or are of the belief that technical measures should be less important, so moving from more scientifically, technically oriented measures to more open cross-sectoral and cross-disciplinary solutions. Do you think that this is feasible in terms of the political setup in SA or do you still think that we need that strong technical guidance from our engineers and scientists?

Mike Muller: I think that if you look at the practise, you will find world wide that you cannot rely on public participation to make sensible decisions, if the public isn't technically informed... and so use the case of CT again. In CT, widespread belief that if you sort of look after the environment well and if you only manage demand you would have enough water to go around. The result, when there is a drought as was predicted by the technical experts, there's a shortage. So, is that now a problem of the technical experts or is it a problem of the poorly informed public? And if the public is poorly informed, how do you deal with that to make sure that they can contribute to the decisions. So, to have decisions taken by an uninformed public is a recipe for wasting money and running into repeated crises. We've seen this in Spain when Barcelona ran out of water and Sao Paolo in Brazil, we see this in Australia. Now if that's the consequence of excessive belief in public participation, well we should be scientific about this, not technical, scientific. If you try something and it doesn't work, do you repeat it? And I'm afraid that the evidence is that public participation without technical information doesn't work particularly well.

15. Thandeka: Ok, thank you. And would you say then the same for actual decision-making process of water regulations, that they should also be very much informed by scientific experts and civil engineers instead of relying only on politicians who don't see the problem of water further than their running taps.

Mike Muller: Well the same principle applies that if you take decisions without understanding what you're talking about then you're likely to make a mistake and that applies to politicians equally to public and it can apply to technical experts who look at one particular solution and try and avoid other solutions. So, for instance the demand management approach is a perfectly good approach which is being promoted in certainly in SA for fifty years, but it has its limitations and interestingly, it's unfortunately the engineers who have tried it and have experience of it, who better understand its limitations. Whereas the enthusiast activist and promoters, quite often they are private sector promoters who want to make money out of it but don't have the experience so therefore frequently run into trouble. So essentially decisions are best made by the people who well informed and whether those are technical experts or politicians or just the ordinary public, the way to make good decisions is to be well informed and understand the context of the decisions.

16. Thandeka: and then my next question, I just generally wanted to get your opinion on the commodification of water and how water is considered as a public resource, everybody has the basic right to it, how do you see the commodification as a benefit or obstacle to attaining water security in general?

Mike Muller: What do you mean by commercialisation?

17. Thandeka: So, like the fact that people have to pay for their water resources, basically making it a more financial process, running water principally for financial gains in SA instead of also looking toward the well-being of the urban population.

Mike Muller: Well you see where is that now happening in SA?

18. Thandeka: No, no, well I wanted to ask if water resources were to be commercialised in SA then would it be a good thing, or would some people then suffer from this?

Mike Muller: The question is, what do you mean by commercialisation? Because some people say that as soon as you have to pay for water at all its commercialised. To which the reply is, well it costs money to provide water and where does that money come from? Then they say taxes then you say where do the taxes come from so people are paying which gives them a more efficient result if they actually pay for a resource then they complain if it doesn't work whereas if they just tax for it and it doesn't work they don't know who to complain to. So, I'm not very interested in people who say the commercialisation is paying for money. All over the world public institutions, NPOs ask people to pay for water so that the costs of bringing water can be covered. Now I don't believe that's commercialisation, but some people do. So, you need to be very clear. You see this is the problem, all these ideas sound kind of very attractive, but usually they are very poorly defined and quite often they are just used to promote a political approach which in understand perfectly well, but if you're trying to understand how something actually works, you really do need to ask the question is this discussion really driven by an understanding of the problems or is this a discussion being run to promote a political point which has actually got very little with the problem for instance of making sure that everyone has water.

19. Thandeka: Yes, ok. Thank you for that. One of my other questions is that how do you think these strategies such as IWRM IUWM in SA, do think they are currently being carried out correctly and how do these strategies consider complex issues such as liveability, resilience and adapting to climate change. So, would you say that the provisions for water governance in SA are preparing us to be resilient city in the case of Johannesburg and adaptable to climate change?

Mike Muller: I would say that IUWM is a bit like IWRM, its an idea thought up by some people who want to promote particular priorities and it has limited relation to practice so I think you'll find that water managers do a lot of things including much more sensible things than are proposed within the sort of theoretic IUWM frame, rather like IWRM people were integrating back in 1970, very formally. It was then discovered in 1992, so ai don't think it has a particular contribution to make and usually what we find is that these paradigms are developed by people who aren't involved in the practice, want to tell people what to do but haven't got the ability to engage with the practicalities so they invent new paradigms. I don't think its very useful and I suspect, as I say CT continues to be a good example of what happens if you apply a paradigm and you don't understand the context, it tends not to work, and you end up looking stupid. And that's what the people who promoted these paradigms are doing, they are currently looking very stupid.

20. Thandeka: Ok, thank you for that, I think my last question would be on the Lesotho Highlands Project, I know this is very, quite controversial and a lot of money has gone into the preparations and such. Would you say that projects of this magnitude and scale, should we move away from more technical measures and focus more on ecological measures towards securing our water supply?

Mike Muller: Ok, let's compare and contrast JHB and CT. CT has been driven since 1995, a lot of promotion of environmental responses, many of which have been implemented, they had a drought crisis in 2004 because they delayed the construction of the Berg River Dam. They've had a drought crisis at the moment because of delayed infrastructure development so I'm not sure that the environmentally based solutions by themselves, they're important but don't work by themselves, they are not the solution. If you look at the Vaal River System, which includes JHB, all the major cities of Gauteng and the surrounding region of about 15million people. They had droughts in 1992, droughts in 1996 and subsequently. Have there been restrictions of the major scale of CT? No, and why? Because the planning balanced the need for the proper management of the water systems internally, a bit of demand management, a little bit of environmental care, things like that, but they haven't ignored the infrastructure and the current problem is in fact that the infrastructure is late which puts us into a window of vulnerability like where CT has been. But if we're lucky there won't be a drought in the next 5 years and then for 10 years after that we will be water secure again. So, I don't think there's any contest. The comparison between JHB and CT suggests that infrastructure, carefully planned and built on time and properly managed, provides greater security for a city than any approach that simply relies on environmental interventions and social and behavioural interventions. There's no question about that, as I say this is not my assertion, this is an empirical fact ok?!

Thandeka: Ok. Thank you very much for time Professor. I appreciate it. You have given me some good insights and a few points to critically reflect on.

Mike Muller: It's a pleasure Thandeka and good luck with your thesis.

Interview 2: Falko Buschke

Date: June 2018.

Time: 15:00:00 h

Duration: 00:28:11 h

Current Profession: Macro-ecologist and Conservation Biologist at the University of the Free State. A macro-ecologist. Not only is this fascinating from an academic standpoint, it is essential for managing conservation initiatives effectively. Falko recently completed his doctoral research at the University of Leuven, Belgium, and am currently a lecturer in Environmental Management at the University of the Free State, South Africa. His recent work includes a study of the ecological and evolutionary processes underlying the distributions of 4423 species of amphibians, reptiles, birds and mammals across sub-Saharan Africa. Falko's research has been published in leading international journals, including Ecology, Conservation Biology and Global Ecology and Biogeography. Falko is also a member of the International Biogeography Society and the Society for Conservation Biology.

Thandeka: Thank you for agreeing to this interview, so just to let you know I am recording this. Can you please tell me about what you're currently working on, I read up online that your expertise is macroecology, so what is your current research is about?

Falko: My current research jumps around a bit. My main research projects at the moment are a lot on biodiversity offsetting, so how we can compensate the loss of biodiversity at one site with an equivalent gain elsewhere. I am also doing a bit of landscape ecology so how can we identify ecological refuge areas in agricultural landscapes where biodiversity can persist regardless of agricultural activities or future climate change for example. So, I am more a conservation biologist than ecologist

1. Thandeka: Ecosystem function as such as natural water infrastructure, how well would you say that the SA govt is taking advantage of ecosys services, by that I mean harnessing the benefits of forest to protect water supplies, wetlands to regulate floods and pollution etc

Falko: Well let's distinguish between the 22 concepts of ecological functions and ecosystem services, services are the benefits we humans get. So, the SA govt I think it depends very much on the scale at which you are working. I know for instance at the national level, SANB and the CSIR have done a lot of good work in trying to identify ecological infra or natural capital that provides water for the whole country, so they have identified the Lesotho highlands and the Drakensburg has been very important for water service provision. whit. so you build storm water drains, you build pipes, you try and use built infra to manage water rather than natural capital

2. Thandeka: Do you think that there is a place for natural water infra in urban areas or would you say that its been overlooked spatial dimensions and what you have just mentioned?

Falko: No, I think there's definitely a scope for it, the water research commissioned certain projects where they are looking into this water sensitive urban design, but I think the problems in SA run deeper than lack of awareness. We have fairly new cities and they are often not, barely 100 years old and we've got this legacy of apartheid and this unplanned infrastructure of townships that are on the outskirts, we've got urban sprawl where people build outwards rather than rejuvenating the inner cities. I think that's a bigger issue rather than a lack of awareness, how you undo half a century of bad urban planning.

3. Thandeka: so more of reconciliation with spatial planning then?

Falko: yeah, I think most of our major problems are not due to bad planning, its just due to informal settlements that have grown in very unpredictable and unplanned ways

4. Thandeka: With advancement in technology and infrastructure, how would you view the importance of ecosystems of, maintaining water quantity and quality. Do you think

Falko: Yah I have a lack of experience in this, but my perception is that its usually noticed in hindsight after problems have happened. A typical example is informal settlements where people are building their shacks on river banks or in flood plains and its only after a heavy downpour that people realise maybe we shouldn't have paved over this catchment area. So I think its only in hindsight that they notice the value of natural capital.

5. Thandeka: In the SA context, bearing in mind all the political and social issues we have, do you think concepts such as IUWM have a place in our urban water management scheme or do you see it more as a utopian paradigm?

Falko: No, I definitely think that there is place for it but not in the perhaps theoretical aspect of water storage and water purification so that actual how can I say, that provisioning ecosystem services and rain water harvesting and purification, I think that's more utopian. I think where the value lies is more in disaster risk management so the regulating ecosystem services such as sediment reticulation, flood attenuation making sure the catchments are healthy and that we have wetlands upstream that can buffer against extreme rainfall events. So, I think that these are the low hanging fruits we could focus on, more terms of disaster risk management rather than water treatment and clean water supply.

6. Thandeka: In enhancing the integrity of ecosystems is one of the approaches to adapting to the impacts of cc, would you say that that is indeed taking place, so basically education about ecosystem integrity and would you say government is actually making enough efforts towards adapting to impacts of climate change

Falko: There again it's an issue of scale, I think at a national level and perhaps even at a provincial level there is a lot of planning going into this, for example critical biodiversity areas are identified with ecological processes in mind, I think these larger catchment processes are being integrated into national and provincial level planning. The scale of individual projects and municipal planning, so I think at a local, project level, ecological impact assessments generally don't look at that type of thing. They look more at features, so are there endangered species, is there a lot that's gonna be broken if we build within a 50-meter flood plain. They are not actually thinking at that conceptual level that I think youre referring to. The same is true for urban planning and municipal planning. It's done pretty much on an ad hoc basis, as things have always been done. So, they'll have their plans and try and fit in new applications to the existing plans. But these existing plans might be 30-40 years old.

7. Thandeka: Building on that, and not to be presumptuous, would you say in your experience that there is a shortfall in governance of all these processes? Especially at a local level?

Falko: There is undoubtably a shortfall, uhm, the municipal level, I think its not as bad in the metros I know city of Cape Town have they own water crisis but their thinking along these lines as far as I know Durban has also been doing ecosystem services assessments and I assume Jhb and Pretoria have, Bloem I don't think there's anything of that nature. Once you go to the smaller towns, the local municipalities and outside of the metros, there's no capacity to implement this type of thing. I think



their struggling just with basic services like refuse removal and those things. They're not thinking about these high level issues.

8. Thandeka: Resilience and such have become a popular buzzword over the past decade. One of the challenges of climate change is the high level of uncertainty of impacts of cc. Would you classify the current state of the natural environment as resilient to the impacts of climate change? So natural resource availability and

Falko: mmmmm, that's a tricky one because I think it depends very much on which segment because we're a very unequal society. So, I would say on average Johannesburg is not resilient at all. There are pockets of the county that are quite resilient so the wealthier suburbs, and people and the well-established industries. So I think, I mean if we were looking at industries like agriculture for example I think the large commercial farmers are prepared their planning for changing rainfall for example and rainfed agriculture I think it's the smaller farmers that are gonna get hit hard. That's what happened with the 2015 droughts the smaller farmers had a huge knock but I think the commercial farmers the large farmers did take a knock and lose lots of revenue, but they were buffered against it. If we look at a city of Cape Town, same type of thing. On average I would say SA is not particularly resilient because the poorest people are generally in the most high risk as well, so informal settlements in the banks of rivers and such are the first to be in danger.

9. Thandeka: Building on that, would you say that bulk water allocation is something that needs to be reassessed in terms of securing water? Because I speak under correction but as it stands about 60-62% of water resources are allocated to agriculture so do you think this is the right way to continue doing things or should we actually reassess the water allocation?

Falko: I'm quite a novice on this topic so I'm not speaking with any level of experience or expertise but my impression from speaking to people who know more than me is that it's not so much an issue of allocation, it's an issue of enforcement, so it might be that there is enough water and your water user rights have been fairly allocated but I don't know if there are consequences for people who use more than is allocated. It's only when 2 water users confront one another and there's conflict when those issues come up because there's lots of regular monitoring. Uhm yes, so I don't know if it's allocation per se that's the problem because the availability of water is usually not the restricting factor with irrigation for example. It's whether they can afford the energy costs to pump that water. Energy costs are more often more limiting than water availability.

10. Thandeka: You were part of the panel discussion on more specifically you were reporting the findings of the discussion. The question here is that the main constraints to effective water management were sighted as a lack of enforcement of our progressive water policies, deteriorating infra and all that. Do you think that this is indeed the case and what would your personal stance on the matter be?

Falko: I think that pretty true but true everywhere is that you can have a brilliant policy but if you don't actually implement and enforce it then it's not worth the paper that it's written on. Some people might argue that if you can't enforce a policy then it's a weak policy, but I think in SA we've got a different problem cause we have a serious capacity constraints and there's a real imbalance. There are people who can implement who can implement this well. In the metros you might have a lot of capacity and people with a lot of experience and expertise but once you actually try and take that policy that might be successful in the city of Cape Town, and try implement it in a smaller area, then there just isn't the capacity because the municipality might have one person with a town

planning background who's now the environmental manager and they have to try somehow implement this progressive water act and they have no clue where to start. I think SA has got this huge capacity constraints in the regard. Even when you do have people who have the expertise, their just so thinly spread that they don't have the time to address a specialised task of implementing these high-level ideas.

11. Thandeka; So just a follow up on the previous question, its not only a government but an institutional issue, educational institutional issue that most water experts, scientist engineers and researchers are either of or reaching retirement age and so there is apparently a lack of skilled, would you say there is a lack of incoming skills, the next generation of qualified experts to take over or would you say they are there just not receiving the adequate training because the actual experts are so thinly spread?

Falko: that's a difficult one to answer, I mean I work at a university so I cant say that were doing such a bad job but I think uhm, The problem that we have is that we're training specialists when actually we need generalists, I studied overseas I've worked overseas and well SA graduate can fit in quite well in an academic environment in Europe or the US, so we have the academic expertise but what happens is that when that graduate has to walk into a job, they might be qualified as a let's just say an ecosystem service specialist and walking into a municipality then suddenly their expected to deal with issues beyond what they have been trained for and they become overwhelmed so it's a really difficult challenge for me working at the university to have to uphold that level of academic standards that the specialists need in order to get a degree that ---- break in connection. So, you have to have an internationally competitive degree with a high degree of specialisation, you need a resilient graduate who can basically be a problem solver and I think that dichotomy we're losing. I think where we have in the past people used to learn that through experience, so they will start with a lower level job and then pick up the general skills and work their way up, I think that the cohort of 50-year olds plus had 20 years to build that experience but now they're leaving, leaving behind a vacuum, so you get 25 year old graduates that are being put into quite senior positions where they are overwhelmed and then 2 things can happen. They either just hide away in a corner and focus on their little niche they know a lot of or they over estimate their expertise and think that because I know a lot about ecosystem services then I know about urban planning and You've got these completely underqualified decisions that they should jot be making. So, there are 2 ways that mistake can happen. There is a lack of capacity and I genuinely don't know how you would start fixing in it, it's what we struggle with everyday

12. Thandeka: Bringing it back to the research field, cross-sectoral research especially in water resource management, would you say that it's something that is taking place because like you just mentioned now, you need a bit of a general skills set, it is taking place amongst institutions of higher learning, so within and cross institutional collaboration?

Falko: It is taking place and I think SA is producing some world class research but there's again a difference between, let me take a few steps back. There's this perception that you produce novel research that gets published in an academic paper and someone pics it up, applies it and it gets implemented on the ground. That's not how it works in reality. We have our academic researchers who write papers, we get grants and write more papers and our reputations build. On the other side we've got the practitioners and their following more a post-normal science approach. They are doing very applied hypo science where they just learning enough about the system to implement the next step and that it usually done with a lot of experience, its done with what they call extended facts. Generally, not published in formal literature and you wont read about it in science journals. It's the institutional knowledge build with connections between people who've been working together for

10 to 20 years and I think that's what you're referring to just now about that being lost when those people retire because it's not being captured in formal literature.

13. Thandeka: Would you then say that research in environmental and water resource management encourages social learning? In a sense of creating or raising awareness and conscientising people towards environ issue and water scarcity, at a grassroots level> and do you think more needs to be done then, coordinating with different municipalities and research institutions and government just to educate people more and make people aware of this issue of scarcity?

Falko: yeah, there is a gap and I think tis also the issue within academia. I think the real leaders in the field are thinking along the lines of what you've descried, how do we implement resilience thinking and make it user friendly so it can be applied at a local level. I know that type of stuff that the Stockholm resilience centre is doing and university of Stellenbosch has also now got this special unit of systems thinking and resilience that their focusing on. So that's really marrying this world class leading academic research with real applied problems, but there are only a handful of people in the country doing that. One of the more research done at university is more conventional, more academic, more the stereotypical naval gazing academics, in a perfect world this is what we should do and they are not bridging that gap. Then at the municipal level there is just, they are struggling just to basically keep their heads afloat, especially smaller underfunded municipalities. So, they are not even thinking at that high level of where ca I find that leading research. They are actually just, how can we get to the same level of where we were several years ago because those people who have retired have left this vacuum and we don't know how to stop it. In places like the free state, not a single municipality had a clean audit, so we have this issue of a combination of incompetence and corruption. Sometimes its not real theft in the form of corruption, its well-meaning people who are well in over the heads and make very poor decisions so its really that we are struggling with huge capacity constraints, not a lack of novel research. Basic things that aren't being implemented

14. Thandeka: Cape town, all the focus is on CT and how they are reaching day zero and all that uhm, looking back at the back at the drought they experienced in 1992 and the construction of the Berg river dam, do you think CT could have avoided this crisis and what do you think that other cities and municipalities around SA can do to avoid becoming a CT so to speak?

Falko: I don't think CT could really have avoided what happened, in hind sight you could find things that they could have done differently but their water crisis is a typical wicked problem where its just a combination of people immigrating into the city, then the population of CT has really increased, and that's actually because of good governance because things were working so the pop has gone up. Ok fine maybe they did not plan enough for that, but I mean that's hard to say... yeah there is climate change models and the elnino that has brought this prolonged drought. All the models said about 2 years of drought, but I think its going on to ¾ years. I think yah, it is a wicked problem and I don't really know how e can plan for that in the future, especially not in the short to medium term. Other cities like Bloem for example will have an easier task of planning because I think we have 70% of our water losses is due to leaky pipes, illegal connections, poor infrastructure and just by fixing that we could really increase our water supply just by making sure that our pipes aren't leaking. That is not so much the case in CT, they were on board, doing regular maintenance and they were actually at full capacity when the water crisis hit so the optimist in me says a lit of the rest of SA has that buffer just by doing the basics well, making sure that water is not being stolen by illegal connections, not being lost by leaky pipes, making sure that water is yeah. Bloem has also had water restrictions for the last 3 years but you drive through town you see water leaking into the roads because of blocked sewers and water is over flowing you can see leaky pipes, people watering their

gardens in the middle of the day, there is no implementation. Doing the basics right in most in most cities will improve things, once you've done that and then you get these extreme weather events, these 3 or 4 year droughts, these extreme events predicted, then we will have a problem. But yah I think there's at least a lot of space for adaptation in most SA cities.

Thandeka: Thank you kindly for taking the time to converse with me. It has been insightful and informative. I was wondering if you could please help me identified other experts, such as yourself that would be willing to have a chat with me on the same sort of line of questioning?

Falko: Uhm, yes sure Thandeka, what I will do is send you an email with some names of people you could potentially speak to.

Thandeka: Thank you, I would really appreciate that. Thank you once again and I look forward to receiving your email.

Falko: No problem. Bye.

### Interview 3

Dr Richard Meissner:

Expertise: Water governance; Transboundary water politics

Date: 6 June 2018

Time: 13:00:00h

Duration: 00:40:40h

Richard Meissner holds a PhD in International Politics from the University of Pretoria. His area of interest lies in the analysis of governance, institutional, policy and political dynamics of the water sector; analysis of policies, programmes and plans regarding water resource management and water-related issues according to research paradigms and social theories; and the involvement of non-state actors in water governance, water politics and environment related matters.

1. Thandeka: Before we kick off, I'd like to know what you're currently working on?

Richard: I can tell you that we've just completed a water security project that was a 4-year project and so we are giving feedback to the different stakeholders at this point in time, what we're also busy with is we are uhm doing a what they call an ecological infrastructure project in eThekweni, but they haven't started with field work yet but it's a follow up on the water security project so uhm. Yes, those are projects we are looking at, well one project that I'm leading at the moment. And then there's another project on environmental migration which is being led by Inge Jacobs-Mata, she is also leading the household water behavioral study in the 6 metros

Me: that actually does sound interesting especially the study on water security

2. Me: So, the general assumption when something doesn't go right, especially in the context of South Africa, coupled with the water scarcity, it's easy to assume that our water problems are due to a lack of adequate governance. Would you say this is indeed the case as South Africa's water policies have been lauded as amongst the best in the world?

Dr Richard: So, yah you know what, there is, I think there's a combination of governance issues that's not gelling very well especially in SA's institutions, but also not only in SA's institutions but also at the household level. I think that it's a combination of that and also the environmental nature is against us, being in a water scarce county, so you know if when we talk about governance, we don't only talk about governance from a government perspective, or the practice of a government or government institutions but also from the factors of a government and its institutions. We also take it down to the individual level. And I think individually, and this was expected in some of the interviews conducted in some of our water security work, is that the uhm you know, at individual level is there seems to be a notion of, how can I out it. That as soon as you open the tap and water comes out, you are water secure. So, but when a drought hits, people keep on continuing with their behavior so governance at that level, at the individual and household level is also for me problematic, not only at DWE's level or at any other governmental level as such

3. Thandeka: So, you basically have to break it down into a regime level, from macro to micro and analyse it in that way? Instead of looking at the overarching

Dr Richard: Well we also conducted a catchment management agency establishment process lessons learnt project together with UKZN (University of KwaZulu-Natal and during that research we found that people, public administrators are, we have very good public administration in government so

that does really good work and they govern very well but often there are other things that come in like ideology and party politics and things that bedevil things. I would say that at those different levels you will find a combination of very good governance being practices and then something bedevilling it. I mean if you take it at the household level, if you govern your household water use where you reuse and recycle some of your water and you compare it to a household that doesn't then issues can be raised. Because not all household's waste water some are very diligent when it comes to saving water and recycling water. Then there are those who just can't be bothered so at those different levels and also at the different units you need to take that into consideration.

4. Thandeka: We know the DWA isn't responsible for implementing their policies, but rather overseeing their implementation by the responsible agencies, do you think there is sufficient monitoring of service providers upholding the values of the ministry

Dr Richard: I think there won't be any clear yes or no answer with respect to that. I have conducted interviews with people from the water quality services at NDWS and they told me that that unit or directorate has lost a lot of its capability and equipment and its monitoring and evaluation of water quality services over the years but at municipal and waste water treatment plant level, we've interviewed people where they tell us that they take samples every hour and then they communicate that to the responsible person in the municipality but you know what, there is something to be said in respect to coordination between DWS and local government because the mandates differ and in many instances what we found, especially in Sekhukhune there is a very top down hierarchical approach in coordination between DWS and the municipality. DWS would take a landlord-peasant attitude towards the municipality and municipal workers, take on a policing role instead of a coordination role. I have seen this in meetings between DWS and the municipality where the municipal officials get threatened with legal action if they have a waste water treatment problem or isn't running as it should

5. Thandeka: Policy development is influenced by numerous actors, so whether they are non-state actors, there is also a number of advisory committees and water boards. Do you think we have an institutional overload, where they become more competing than complementary? Or do we need more

Dr Richard: I think we've got enough institutions. In my opinion, there is, we tend to have a look at regulation and regulatory mechanisms as the fix for everything, it's like the panacea and tomorrow we will be debating at a panel session whether one needs more regulatory mechanisms for to uhm for water stewardship to encourage companies to implement water stewardship programmes. I don't think there is because many times what happens is that there is a uhm, how can I put it, people do things voluntarily and we see this at CMA level where you don't need to tell an entity like CM Agency how to do its job or what not to do so uhm, we uhm so I don't think that we will need more institutions we have enough. It's just that those institutions need to be better managed and I think with problem lies with ideology. We have a very stringent and top down type of ideological enforcement through the ruling party you know and it's very hierarchical and its sometimes-soviet style and if we can maybe deal with that I think things would start falling in Place. And also, with the past couple of years, all the cabinet reshuffling and all really didn't help the situation

6. Thandeka: It's unfair to ignore the historical context in SA but equally unfair to continue blaming the apartheid regime for the current water crisis. What kind of conversations do we need to be having to encourage social learning and bottom up initiatives towards

Dr Richard: You know what, I think uhm I agree with you that you should always remember your history, never forget your history but don't hop on your history and say that things are now much better than it was during apartheid but we miss the point that we, the ruling party has a tendency to compare its government with the old national party government and what it actually should do is compare its governments with its previous governments because we haven't had the same government since Nelson Mandela, we've had successive ANC governments so they should compare themselves with themselves, we should have a comparison at that level. I think that some of the conversations we should be having you know, is what role should the individual be playing in resource management and not so much where is government because people always ask where government is and then govt stands up and says well here we are and the situation is much better than it was 25 y/a.

So, I think we need to bring in the individual and communities much more to the fore in conversations and say let's admit that we have a developing country government, we don't have all the resources, resources are very stretched and so what can we as individuals do for ourselves, how can we have a more self-governance type of arrangement to manage our water resources you know?

7. Thandeka: So now moving to urban water management, considering concepts such as IUWM a lot of people would classify those as global north paradigms, do you think they have a place in south Africa in terms of capacity, the political and social context. Do you think that these paradigms can be implemented correctly, or do we need to sort of develop our own from what has been put on a global platform?

Richard: I would say we need to develop our own, because you know what happens, I've seen this with IWRM and adaptive management as well. We take those concepts and then we tweak them here and there and we especially bringing a little bit more, we change the vocabulary the nomenclature and things like that. But what doesn't happen is at a fundamental level uhm, we, we you know change the underlying paradigms and philosophies because these things contain philosophies that are not indigenous to SA and even the African context you know. So, we take it and think that people are everywhere the same, the Europeans know best so what we need to do is, we need to just take that and that will solve our problems. But we don't change the underlying philosophies, paradigms and world views and perspectives. I think that's what gets us in trouble, however if we can start from scratch, to start building things from that, metatheoretical level where it is already in-sync with local thinking, beliefs, values cultural systems and things like that then I think we have a much better chance to get it right than to just take things as panaceas as implement them

8. Thandeka: considering the geographic positioning of JHB, it's not like other cities that have large bodies of water in close proximity, do you think that such large cities that are expected to absorb the growing population, are we doing enough to secure water in terms of demand

Dr Richard: Yes, I think we are doing enough. DWA has dedicated the strategic planning unit, there's forever master plans and projections into the future based on pop and economic growth, urbanisation, not only population with respect to population growth but also linked with migration, immigration and emigration within those large cities and we, during our water security project we had 2 interactions with that specific directorate and these guys are on the ball hey, they explained to us, we had interactions with those that are with that portion of the directorate, responsible for Gauteng and I mean the uhm, what they told us you know is that they are forever looking ahead and trying to find out how much water will a city like Johannesburg require in future and what else can

we do because if I'm not mistaken they mentioned that the options for building more dams in that area is running out because they don't have suitable dam sites so they are now really looking like 40 years ahead to say what changes need to be implemented now so that we can, we don't run out of water because we can't build more water

9. Thandeka: do you see the geography of JHB as an advantage or disadvantage in the sense of allowing a space for innovation and creative solutions or do you think it's fair to write it off as Johannesburg is inevitably going to suffer

Richard: I don't think so because for me it is, I look at day zero for instance, let's take that as an example in Cape Town, everybody said day 0 will happen on 13 March and then the date came and went. People forget, and this is especially a thing in the natural sciences and very much in a technical environment. They forget that you have people who can think for themselves and can think and that have the ability and capability to take actions, innovate things, then to postpone for instance a day 0 scenario. Things are not set in stone, I think that's going to be the same with very large cities. What do people do now so that they can change their future down the road, so they don't end up in a situation where they will have a day zero. I see it has been pushed back again, so you know that's the thing, people are capable and able to do things and they can affect the future, whether positively or negatively. I don't think Johannesburg is doomed in that regard because in my opinion people will take action.

10. Thandeka: Zooming in on Cape Town, the 1992 and 2015 droughts, I've spoken to some people who are of the school of thought that had the Berg river dam project been worked on efficiently, CT could have avoided the status quo, and I tried to make a comparison with the Lesotho highlands projects.

Richard: I've also listened to that debate and I'm not too much of a planning expert to say ok, they did not do enough planning, or they did. Because if I listen to Mike Muller he says no they didn't do enough planning if I listen to Helen Zille, she says they did enough planning and they warned DWS so there's Mike Muller from the ruling party and Helen from DA so there's the blame game. I think it's immaterial, in my opinion, after the fact it's a moot point whether they've done enough planning or not. The fact is that planning is, and here I think one should give credit to the DWS, they are forever planning ahead. You can't expect a city to do the planning for bulk water supply. I am taking Mike Muller's position, Helen Zille's position, DWS do plan ahead but you can't expect for a large city to do its own bulk water supply planning that's a DWS responsibility. I think one should maybe look at it from that perspective and uhm so that's basically what I can say about the planning, did they or didn't they do enough planning. Another thing that I agree with is what Trevor Bolts said is that it's an abnormal situation, it's a 1 in 300-year drought in that city so you can plan everything but if that thing hits that's it (23). That's why I'm saying that nature is against us you know. It's a 1 in 300-year drought. That I think bedevilled everything, people went listen they politicised it, you can't do anything about nature, it's one of those things you know.

11. Thandeka: among others, resilience has become a popular buzzword in the last decade, there's also a high level of uncertainty of these impacts, would you classify the current state of the environment, availability of natural resources a

Richard: Every time people ask me about that I have to think about Jurassic park, that character, Jeff Goldblum plays, he always says that nature will find a way and you know it's a story but I have a tendency to believe it. The human element, we shouldn't tend to throw away the human element because we can, what we do to our environment, if you look at the plastic pollution going on, what we do



to our environment, it can only take so much so it won't find a way, a solution on its own in the immediate future. I think it will find a solution, we need to also maybe find uhm ways of doing things a little different but more different well we have to do things not in a business as usual way, but we need to do things, we have to help nature along and I think that we can play much more proactive role in ensuring that the environment becomes more resilient

12. Thandeka: looking at the whole planning trajectory and the way things have evolved, planning in terms of resource (27)

Dr Richard: uhm, yeah, I don't think that the engineers have such a big influence anymore, I think the social scientists have come in over the years to play a much more stronger role to help along arrangements and governance and to give insight into those things. I think the social sciences have also given us a deeper understanding of what's going on you know. So, it's no longer yes let's build a dam or look at population growth because when we have our meeting with the DWS planning guys they asked us to come back to them (and these are engineers) so that we can give them a sense of what's going on in eThekweni and natal regarding the their future planning, where there might be water needed, So they are very much wanting to know what we've discovered so that tells me that they are no longer as dominant as they were 20y.a.

13. Thandeka: Bulk water allocation in SA. I think it stands at around 60plus % for agriculture. Do you think that this needs to be reassessed or is it vital for agriculture to have such a big share of the water resources considering the size of our population and ever-increasing influx of immigrants?

Dr Richard: I think that agriculture is very good at self-governance, especially irrigated agriculture and also your dry land farmers. The SA farmers have learned to deal with the environment because they have been farming for generations. A couple of years ago we conducted a water reduce efficiency study in the SA agriculture sector and they, what we found is that the irrigation farmers are very good at keeping on implementing water use tech, more water use sufficient technologies. They've refurbished their irrigation equipment on a frequent basis and maintain them. They also do what they call a soil moisture content measurement and that they work out their irrigation schedule, so they don't over or under irrigate coz you can over irrigate, and you can under irrigate which is not good for whatever crop you are producing. So, uhm you know I think that, and having a look at your question, I don't think that agriculture is using 60% any more, I think it's much less. That 60 is actually misleading because we think oh 60% and they only create so many jobs and it becomes a numbers game but now the argument goes... take away water from them and give it to more or higher value industries like manufacturing or whatever and in that way, you will save water. Well you know what, yes manufacturing will use that water, but they will also pollute that water more than what agriculture is capable of. If you look at heavy industrial manufacturing processes its highly polluting. So, you take water away so you're gonna sit with more polluted water. That's my take on that one.

14. Thandeka: If water governance were to be placed on the transition spectrum, at which level would you say in the transition water governance is?

Dr Richard: If you look at a scale of low, medium or high. I would put it between low and medium because immediately I think of the CMAs. It's now 21 years that we've been talking about them. We've got a wonderful act, but it doesn't get implemented very effectively and efficiently so not very well and my argument is always that if you have a Ferrari and you don't have petrol, or a maintenance plan for it, that thing means nothing. I just sell it and use that money for something

else. It's the same with the national water act. We have this wonderful water act but many of its principles can't be implemented because of other constraints or issues that bedevil its implementation. Having something on paper is very different to having something to implement that on the ground and to see to it that people get their fair share of water. I think socially, the government has made giant strides in providing more people with water. That for sure I would say yes, it's good. But on governance, I don't think one can place it at a high level.

15. Thandeka: I think we have a bit of a problem in SA in the sense that a lot of skilled professionals are sort of wither at or reaching retirement age and that then leaves a vacuum, a gap between incoming young professionals and the ones in place or outgoing. Do you think its possible for us to bridge that gap and have enough successors to take over from experts such as yourself should the time come?

Dr Richard: Let me start with the 1000s of graduates and I want to pick up on the debate with respect to free basic tertiary education and the fees must fall campaign and such. To have a degree or to have a job doesn't mean that you must have a degree. You can have a vocation as well. I think at that level where everybody is always saying we don't have enough engineers, but my question is do we have enough electricians, plumbers, boiler makers, public administrators that can think for themselves you know, and things like that. From a personal perspective I think that we will be able to bridge that gap because we are at the CSIR forever employing interns to give them on the job vocational training with respect to research and we take them out into the field, we give them all sorts of expertise. I think every institution especially the household sector should maybe, and I think they do that very diligently and proactively should have internship programs in place but those, there are details around training and ,managing interns that I don't want to go into now but I think we have the capacity to bridge that gap and we should not always only look at engineers because you don't need them to operate the waste water treatment plant. You also need a biologist as well. We've done a governance project in Sekhukhune where we asked the municipality, went to the waste water treatment plant and said where's the engineer and the and they said no but what do you want an engineer for? If something breaks? Well if something breaks we want the electrician or the plumber, not an engineer. They said to us, you need your people in biotechnology because its not the engineer that manages the plant it is the biotechnologist that manages the plant. So that's the thing, engineering is not the main skill. I think its used as a proxy and that's becoming a little, it creates a skew perception in my opinion.

16. Thandeka: So, like you have said do you think there is a theory practice gap in implementing all these policies, in monitoring and implementation, do you think there is a benefit in cross-sectoral coordination and is it actually happening

Dr Richard: I think its lacking and the theory practise gap stems from a lack of cross-fertilisation over disciplines, because we think of water as being a natural resource therefore we need natural scientists to help us understand how to manage our natural water resources more uhm optimally and I think if you start looking at the public from a natural scientific perspective, that theory practice gap because natural scientists do not understand governance or the institutional or the public administration process that goes hand in hand with managing your water resources. And I think that's the theory practice gap stems from that there's not enough trans-disciplinarily or when there is its very superficial. Because what we like to do is think of transdisciplinary not as having a group of natural scientists, that transdisciplinary must happen at a very fundamental theoretical level. Even at the paradigmatic level because the social sciences and the natural sciences have different paradigms that they operate on. So, if we can get that right I think we will start closing the theory practice gap, because theory informs practice and vice versa.

Thandeka: Doctor Richard thank you kindly for agreeing to engage with me, this has been very informative and helpful

Dr Richard: It's a pleasure Thandeka, thank you. Goodbye.

#### Interview 4: Ismail Banoo

Profession: Master's degree in environmental science from the University of KwaZulu-Natal. He has over 18 years of experience in integrated natural resource management. Over the past 10 years he has been actively involved in researching and applying higher-level approaches to sustainability assessments and environmental management. He is a certified environmental assessment practitioner. Ismail's involvement in environmental research projects has afforded him an in-depth understanding of sustainability imperatives in relation to development objectives in the African context.

Date: 11 June 2018

Time: 11:00:00 h

Duration: 00:32:27 h

Thank you so much for agreeing to engage with me, before we start, can you please tell me a little bit about what you are currently working on, in terms of projects and things

Ismail: how is this related to your research or what is the context for you?

1. Thandeka: I think it would be nice to know and in case it may be of relevance for my research, and if may.

Ismail: Well we're doing a lot of work around water use management and uhm, understanding individual water user info in terms of national legislation, so that's a big project that I'm involved in. the others revolve around urban level household water use conservation and practice so that's more on internal research that we're involved in, I'm quite involved with that as well. Around behaviour and household level behaviour around water conservation, behaviour and water demand.

2. Thandeka: So, let's get right to it then. We have a generic definition of water security provided by the likes of the Unwater, WWF and so forth, uhm, but how would you define water security in the SA context more especially in the urban setting, taking into consideration the different socio-economic dynamics and different political interactions we have?

Ismail: Water security is such an open-ended thing, I mean look, SA has had the unique situation in the last 2 years or so, uhm, you know where its your traditional definition of water security really doesn't hold water to be honest. We are pretty progressive in terms of our legislation, it's quite strong, it's got the major tenants around understanding water use and water management, conservation and all of these imperatives are adequately covered in terms of legislation. I think the challenge is that our governance you know around the resource, it leaves much to be desired. We've had issues around misappropriation of funding towards water projects and things like that, that's more of a political issue rather than a real tangible issue but obviously lends itself to a situation where we don't have water in the city of CT for example. So, yah that kind of is my view on it, I think

we just need to understand that it's a broader political governance issue that proceeds all the other good stuff that might be in place on water security

3. Thandeka: I do have a q a little later on governance a little later, I will get to that

Thandeka: considering a city of Johannesburg and the size of the city, on a scale of 1-10, how water secure would you say then JHB is

Ismail: What is your geographical boundary then? Are you looking at Gauteng or just the CoJ (City of Johannesburg)?

4. Thandeka: I am focusing on the JHB (Johannesburg) metropolitan area.

Ismail: Ok yah, I think they are ok, uhm, I'd say they are a 7.

5. Thandeka: the narrative these days is that growth is expected to boom between now and 2050, with that, most of it will take place in developing countries, the narrative is that most developing countries have limited capacity to deal with rapid changes, which will lead to more slum urban dwelling and such, do you think this scenario is true for SA and is it possible that we may not actually have the capacity and resources and the most important being water, to deal with this expected pop projection/

Ismail: I think that's a real risk Thandeka, I think for me it's a 2 fold thing. On the one hand you've got urban migration happening, we have refugees for example entering into SA, the environmental refugees are a major thing right now in terms of water security and so forth. That's the one risk I think that hasn't been quantified or well understood and I think there's a need to certainly consider that much more seriously. In terms of SA managing its own needs I'd say listen we are a third world country/ first world city centres uhm, in the urban built up environments, I'd say water security is strong. We have good reticulation systems. Water supply is generally pretty secure in that you've got urban cities expanding quite rapidly to cater for the increasing population according to populations. But as soon as you get a little outside of those areas things like governance, politics, you know, issues misappropriation of funding, to build up those capacities I think that's another risk area that might lend itself to it being a challenge.

6. Thandeka: With your expertise in environmental management, would you say there is a possibility for us to revive all the lost natural ecosystems and still reap some benefits of ecosystem services pertaining to natural infrastructure and sort of water quality?

Ismail: I think so, I think certainly there would be a lot of opportunity to do that, one has to think about that in the context of ecological infrastructure so and that being a driver. You know it mainly links, I mean your question is around ecosystems, it's a very broad term, when you start looking at ecosystems and their functioning its not limited to just water, you have to bring in biodiversity constraints, a whole range of things that impact on that so for me if you focus your Q, say, can perhaps ecological infrastructure link to water security be more streamlined, I would say yes, I think there is an opportunity to do that and I think many global funding agencies for example are funding such projects so yes I think the thinking is there and I think it's a matter of now starting to implement at project level, those kinds of things that can actually help us along that journey.

7. Thandeka; at project level, the implementation of these concepts and paradigms, do you think it's feasible, is it actually taking off or do we still need to lay the paper work and align policies or is it a tangible thing

Ismail: well there is always room for improvement when it comes to administration around projects, uhm, for me I think there's a lot of work that still needs to be done, I come purely from a research and academic background, so my view is a little skewed in that sense. Our influence or the impact that we try to make at the CSIR might be fundamentally different from people implementing a water pipeline project. They might see that as a very tangible project on the ground, bringing water to 5000 people in a community. Well when I look at it, 5000 people versus the 60 000 in the surrounding area that don't have water, our views can be very different. So I think without sounding too pessimistic, there is work to be done, I think our national government department has got master plans in place to bring things to the ground uhm but like I said, again we've had a very difficult past 2 years, specifically in the water and sanitation sector, where there's been a lot of political issues surrounding delivery at project level so I think that needs to be probably, that wrong needs to be corrected first before one can actually answer that in 2 years' time.

8. Thandeka: On the topic of transformation, it requires a fundamental change, which in the context of sustainability also requires radical systems shifts in values and beliefs, and patterns of social behaviour. Such thing should also be then looked at multiple governance levels and management regimes, would you say transformation to a more socially conscious society is taking place, a general awareness to pressing issues and how they can affect us in the future?

Ismail: It's a good question, I think certainly the last 2 years the drought we've experienced has fundamentally helped that transformation. Uhm you know people's behaviour around water now is very different if you asked that 2 or 3 years ago. You know we had a very a skewed view that water was a resource that is always readily available even though we're sitting in a water scarce country you know, and our risk and vulnerability in terms of water insecurity is very high, it continues to be. So, for me I think like I said this little patch that we've gone through in terms of having drought conditions in all our metros uhm, we position of, you know water shut down in areas and you know tinkering of water. It really has transformed people's behaviour in that way, so I think there's a view of the resource much more differently. I think even the person on the ground is not readily thinking about wasting water as would be the case in the past.

9. Thandeka: do you think we actually have the capacity to shift to a fundamentally new system or are we entrapped in the business as usual manner of going about doing things, is societal change a long way away? I think you have sort of answered that question that were well on our way there.

Ismail: We are on our way towards what Thandeka? Exactly?

10. Thandeka: To a fundamental system change considering the complexities involved in water resource management generally?

Ismail: ok I get you, you right I kind of have alluded already. You know its important that systems thinking to push your mind in that direction but what we need to be cognisant of moving forward is that how we yardstick, the measures we use towards reaching that goal has to be very clearly defined uhm, for me I think that is an area where things like MNE are not particularly strong in SA, you know and that's something that's I think is almost taking stock of where we are, what we've done, what have we invested in and if there's a need for a paradigm shift, a need for a new trajectory, specifically around water and water sustainability issues then that is to be the starting point against which we take it further.

11. Thandeka: In the last decade or so, concepts such as resilience adaptation and such have become buzzwords next to sustainability. Would you classify the current system as resilient? Do you think we would be prepared for a day zero scenario should it be tomorrow, or do we still need to build our social capital in order to be resilient in a true sense? Also resilient being one of the broadly definable terms but then looking at socio-ecological systems

Ismail: I don't think we are there. I mean resilience is such a broad term. Day zero for example, came with many different issues were we ready, what was the planning around it, you know my conversations with some of the provincial water affairs/ water sanitation department officials was very interesting to say the least and I think uhm on one hand they would argue that the city is resilient towards a day zero but the reality was the media campaign around such an event looming and things like that really didn't help us, you know understanding the issue properly so there is I think pockets of it, there is resilience in specific areas, uhm but I think there's room for improvement as well. One needs to look at those things a bit more closely.

12. Thandeka: Ok, now shifting to water policy and the water act, SA has apparently got one of the best policies, so the status quo is that people would say that our lack of water is somehow a result of inadequate governance. I don't want to be presumptuous and say this indeed the case but s there then a shortfall in governance or the implementation of the measures set forth in policies and such?

Ismail: I think you've summarized it already. The legislation we have in place, the various supporting legal prescripts, frameworks guideline documents are exhausted, there is plenty of information available to help us on that journey, uhm I tend to steer away from the political side of things because that is not my area of expertise or the main reason why the interest. But governance is a sustainability paradigm, uhm governance is the overarching circle. One can have the social issues, ecology issues as well as the biophysical and economic and all of that well mapped out but the way you manage those circles within a governance framework will ultimately tell you weather you are making it to the end goal or not.

13. Thandeka: with what you have just said, how do you think we can best compensate for these shortfalls and realise the benefits of the water policies we have?

Ismail: well you see like I said you know, the implementation of the statutes of the act and so forth, the dept of water and sanitation has done that. They constantly doing new projects in relation to section 35 or 48's mandate around water use, or a sanitation related around water quality setting up projects for example catchments. They are implementing the act as required, like I said the challenges arise when your things get what's the word, side-tracked or you know money has become unavailable on a project because funding has been cut and things like that. So, now you gain some momentum around achieving the broader goal or getting towards it but unfortunately you lose the good work that's been done at that point because of other issues creeping in, so it's a challenging environment so its an area that one really has to be very resilient in to continue on functioning

14. Thandeka: So, I'm going to move more on to an urban water management perspective, or context. And so, we have paradigms such as IWRM, and IUWM, a lot of people argue that these are more global north paradigms and that they don't really have a place in developing countries, such as SA. Do you think that this is indeed the case, that theses concepts are sot=rt of almost superficial and we don't have the means to actually implement them adequately?

Ismail: can you give me a bit more context to these concepts, it's a bit to broad ended for me to focus my mind around

15. Thandeka: I will just stick to IUWM for example,

Ismail: some of these things are just so huge, like I said the world bank defines it differently to the way, like I said SA defines it. IUWM there's so many different things that talk to that, its around urban planning, infrastructure, its around uhm industrial development its around you know water as an input into all of those aspects you know. Uhm so I think look, SA has and I make the point that I think SA's cities are world class, I've had the good fortune of travelling into Africa, I've travelled into other parts of Europe and we are comparable if you look at some of our urban cities, we are right up there, we have the infrastructure and technologies in terms of water treatment, works, in terms of our meeting water quality standards there are in international best practise. So, I said we also have the dichotomy of having 20km out a rural area which is suffering from major issues, uhm so you know for me IUWM, you have to strictly define the boundary of urban, it has to be a built-up city with an x amount of populous, etc. then yes, I think we are there, I think our cities are fine you know. Some of the emerging cities like PE East London, along our coastline, and even inland could probably use a bit more support from govt to get there. But our major cities ae right up there.

16. Thandeka: Urban has deferent meanings and different manifestations in SA. Like you mentioned we have the built-up environment which has been planned and provisioned for but then right on the peripheries of these environments you get informal settlements that pop up. To what extent do you think these areas on the peripheries threaten water management and planning and eventually water security? Is there a way to reconcile the different manifestations of the urban environment?

Ismail: Well its quite obvious that they have an impact. It's very difficult from a social perspective, I mean I personally do not look at, people are not by default poor and meaning that their squatting these are my fellow black South Africans and they have an absence of options and they have to settle somewhere so for me I think what's important in that is how does for example the city respond to these rapid changes, that for me is tricky part, because you know like a within the space of 3 months you might have 5000 people in an informal settlement which was never planned for, its got major issues around storm water management, around you know, sewer reticulation, your urban planners, your IDP planning and so forth so those are the kind of issues that I think definitely have a major impact in that regard, but uhm I don't think we can, my personal opinion is that one cant sit back and say well this is a problem and it's a problem that we need to get rid of, uhm well we have to be very cognisant of the fact that these our humans beings trying to meet their basic human rights around living and having access to water and sanitation and I think it's important for every South African to rally and support these numbers of people that are looking for homes.

17. Thandeka: looking at where informal settlements tend to pop up, on the banks of rivers and perilous areas when we have heavy rains and such. Do you think that its up to local government like municipalities to make sure that these areas are secured or that people don't settle there, in an attempt to save them from future damages and risk?

Ismail: Look Thandeka, that's a catch 22 situation, uhm access to water is the need in many informal settlements so if you look at them in Durban Khayelitsha in CT, In CoJ, you find them very close to rivers and I think its quite obvious why because one has to have access to water. How the cities support them and such, you tell me? How do you make a river system safer from people? You know I'm struggling to understand how one would do that, put up a fence? How long would that fence

last? So, yah Its really a catch 22, I actually don't know. I don't think you can do anything about it, I think in terms of human health and human risk to living in a 1-50000 flood plain or whatever it may be is the only legal mechanisms one can use to possibly move people out of a flood zone but jeeze good luck trying. I personally would never support any initiative that would do that.

18. Thandeka: looking at the more research and academic filed, would you say that there is enough cross-sectoral collaboration in terms of research so with water management, ecology, biology and such to inform efforts towards cleaning up and protecting our water resources or would you say that that's something lacking in SA

Ismail: You shouldn't be asking that to someone who work at CSIR because the answer would be absolutely yes! Uhm but for other people perhaps the view might be different. I think we have very close collaboration with the university system so I work very closely of the UKZN, my colleagues work very closely with UP, UJ, and I think the body of scientific knowledge that exists between ourselves as research institutions are there, there is a sufficient amount of info to help us around the journey, there's many burning research questions that are emerging in the water space now that probably require more longer term research investment and at that I alluded to it, for example urban migration impacts on water security for example. The impact around urban household water use behaviour. You know these are aspects which have never been researched ever you know, in the water space. So those are things that are emerging areas that we would like to know more about specifically for the purer hydrological sciences. I mean my hydrogeology colleagues would argue that there's lots of work that needs to be done around understanding ground water models in SA as a potential alternative water supply source, likewise my colleagues from water quality might want to know more about the impacts of desalination and how that would impact around our water quality and human health consumption aspects and the discharge thereof, and then we are bringing in our coastal units. Our coastal research is around what can we discharge into these natural environments from a desalination plant. The integrate nature of our work is there, the environmental, the work that we're doing in the space that I sit so yes, I think it is happening, I think they could definitely be more things that we could research better, but the integrated nature of the CSIR allows us to do that quite well.

19. Thandeka: My last question is sort of twofold question, a lot of people would argue that most professionals be it in the academic field or in the practical project arena, would argue that there is a shortfall of incoming skills and most skilled professionals are either of or nearing retirement age and so we are unable to bridge this gap, you being a professional at CSIR, working closely working with many institutions, will there indeed be a gap at some point or are we making efforts to fill the

Ismail: well I wouldn't say that there is a gap, I myself am a mid-career person, I've already got 20 something years of experience in the field but I think there's many people like me. I've come through the university systems like the graduates are coming through now, but I you specifically speaking about the water sector?

20. Thandeka: Yes, specifically the water sector

Ismail: Yes I think there is definitely demand for more capacity to be transferred, the needs to be better succession planning that needs to happen amongst some of the ageing and outgoing engineers and chief engineers and you know specialists in the field, yes I think there's a need for that but I also don't sit here thinking that if these people disappeared tomorrow, that we would all come to a grinding halt, it's interesting you ask that question coz I went to a panel discussion a couple of



weeks ago asking me this very same question and I had a contradictory view from everyone the rest of my panellist. What I'm telling you now is that I think we would be fine. With the younger graduates that are coming through the system now, the millennials would, and pairing them up with the x-generation with the -y-generation I think we have a winning recipe. The people that have been around since the 50s that are leaving us having retired or moved on, you know we can fill that void. We can continue with some good work, but I think the approach, the way things are done now compared to 20 or 30 years ago is so fundamentally different that it actually is important that younger professionals come to the system with fresh thinking so that's my personal view on that.

Thandeka: thank you very much for engaging with me, this has been very informative, I've gained some new insights and a few interesting leads towards of my research

Ismail: you are welcome. I wish you well with the rest of your MSc. Can I maybe request that you send me the final product of your work, your final publication your thesis?

Thandeka: Yes, certainly I can do that

Ismail: that would be great

## Interview 5: Anthony Turton

Profession: Political Scientist (Hydropolitics)/ Position Strategic Advisor Specialisation Strategic planning, transboundary water resource management, policy and institutional issues, conflict resolution (mitigation), political risk assessment for large infrastructural projects, research program design. He has published widely and is a well-known professional speaker, trainer and facilitator. One of his core skills is his capacity to engage with the media where he has a strong and positive profile. Currently he is focussing on water and the mining industry as a subnational transboundary issue of strategic significance in a water-constrained region with a strong mining economy

Date: 18 June 2018

Time: 09:00:00

Duration: 00:35:57 h

- 1) This water crisis that South Africa finds itself in, its been a long time coming and I'm sure experts such as yourself can agree with that. I understand that you cannot prevent nature from taking its course, but do you think more could have been done in the years leading up to the 2014-16 drought period to better prepare us? Places such as Johannesburg had to have water restrictions, Cape Town as well?

Anthony: UUUHM it's a complex answer because you know clearly a lot more could have been done. As you know SA is a young democracy and we're going through all kinds of democratic teething pains and one of the teething problems that we're having is this whole suspicion of the decolonization of science in universities etc. so the hard issue about water as an artefact of the colonial era has resulted in decision-making elites in government being quite profoundly suspicious of hardcore science. So, science institutions have generally been quite devastated and have also not been listened to. So, it's a combination of an artefact of the sort of the liberation legacy if you like, but also an artefact of ignorance, of many other factors so its entirely a human related issue. I have published to this extent, I've published something in water policy on the drought that exposed a young democracy. If you google that you'll see for example, the whole thing of if you go back to age denialism and western based science, its all part of the same thing.

- 2) SADEC region, drought has had major implications for all countries, how do you see geopolitics changing around this discussion, in terms of SA receiving climate refugees, especially from Zimbabwe and Mozambique? Do you think there is enough cross boarder collaboration to ensure that each country within the region maintains adequate water supply?

Anthony: you asked a lot in that. I think firstly the SADEC region in general is quite well organised in my view. The SADEC water sector is very well structured. But you must remember the history of SADEC, once again we go back to history. SADEC was created in the 1980s as the SADCC, the purpose of that was to exclude SA. SA is not particularly well integrated into SADEC and I would argue that there are other countries within the SADEC cluster that are far better placed than SA at the moment to manage water. Its not because they don't have all of this liberation struggle ideology and legacy that is weighing them down. So, I think SA is increasingly irrelevant in the SADEC context and I would think that countries like Namibia, Botswana are absolute leader in the field, bots are particularly successful in the context of SADEC, even Angola and Mozambique have got some really good water resource managers.

- 3) Do you think there is potential for some form of policy exchange or cross-border learning?

Anthony: You see I see SA at the moment almost as a failed or failing state scenario. Under conditions or failing state scenario, there's no place for learning. There are too many internal struggles and strife. E.g. at the moment we've got the whole thing about the Eskom workers that are willing to switch the entire country off you know. These are such basic issues that how can we have learning under those circumstances, I don't see it possible. I see SA on the trajectory at the moment to a failing state. Under these conditions I don't see any learning from anybody happening until after the state has failed or until you've got new enlightened leadership. I would like to think that Cyril and his team are a little bit enlightened but even there I'm not particularly encouraged by the noise made by the minister of water for example. I just don't see any visionary leadership that's learning and admitting that we got things wrong in the past.

- 4) Unknown unknowns, we don't know what we don't know, what do you think is the best way to realistically plan for the future, in terms of adaptive policies and building resilience, especially at a grassroots and household level, not everyone is able to have backup water tanks and such?

Anthony: well if you don't know what you don't know then you're extremely vulnerable and that's what this is all about. And if you talk about resilience, resilience is really about how to withstand a shock an external shock to the system. I would argue that SA has increasingly demonstrated its ability to withstand external shocks. The major El Nino drought event that hit us 2011-15, the instrumentation of that, if you go back to that paper I published in water policy, there I demonstrate that the very basic instrumentation crashed in 1994, the fact that decision makers didn't know that it crashed makes us, you know, just shows the level of disfunction of govt so I think that we are increasingly seeing that e.g the major drought in 2015 caused major problems in SA. And now a day zero crisis in the Western Cape?! Is nothing more than a manifestation of a complete failure the state to comprehend that climate change and vagaries of nature are important. There's a technical word that I think is important here, that is the notion of decoupling or recoupling. So, SA decoupled its economy very successfully by means of major hydraulic infra. I have a book that I've written that's about to be published and in that I make the case for the fact that we are busy recoupling. Our failure to invest in infra and more importantly in institutions, our failure to do that is causing us to recouple and this of course has dire consequences for 50 million people.

- 5) I want to talk to you about the importance of having a good system in place and by that, I mean an administrative system, a governance system. I don't want to be presumptuous and assume that our water issues are partly due to a lack of adequate governance when we have world class water policies and such, but what is the missing link? How can the system be reconciled?

Anthony: you know when I was at the CSIR, we had a major problem they had a world class body of scientists that were increasingly frustrated because the good science we were doing was generally ignore by government so what we did was launch a project, a special program and we published a book called governance as a dialogue. I don't know if you've come across it?

Thandeka: yes, I did some reading on it for my research.

Anthony: yes, now that book actually came out as a direct result of the scientists' frustration that government was not listening to its policies. Science then asked a question, in a democracy, a young democracy like South Africa if government is not listening to science for whatever reason, does science have a moral duty or obligation to communicate its findings to society rather than to government, we spoke about the democratization of science and we launched a concept of science

in the service of society. So, in other words this was all about a moral dilemma that scientists found themselves in and the whole book was really it was almost a protest actually, if you like, saying that if government won't listen to science, when they're confronted by science I think we made the right decision, you know, that science, especially enviro sciences. Enviro science can never be politically neutral because it's never gonna follow an ideology, its always gonna follow the facts and ideology doesn't care about facts. So, I believe we did the right thing in that book!

- 6) How do we reconcile short term-adaptation and long-term mitigation in terms of climate change and planning for the future?

Anthony: I think as things currently are, it is so dysfunctional that the system is gonna fail. And its only after the system fails will we then be able to reset the system. So, we have some cross-roads. At a T-junction rather, I think that's a better analogy. At the T-junction, we are either going to say right: we now need to collectively as a nation make a decision about improving governance and then realising the value of technical people in positions of authority and advising etc. and in the short term or else we must ignore it and let the current political discourse take its course which I believe is then ultimately brings on another revolution

- 7) I want to talk to you a little about the importance of urban planning and water management. Especially on the front of informal settlements. This is the cheapest way for people coming from all over the country and even the SADEC region looking for opportunities in Johannesburg. How if possible can we better plan for informal settlements and reconcile them with existing systems, how can we make sure that these places have the basic infrastructure for potable water and sewage?

Anthony: look I'm not an expert in any way on urban planning or on particularly informal settlements but I have had a lifetime of observation. So, my simple observation is that the essence of an informal settlement is the fact that its informal, in a response to a set of circumstances of which the individual has no control. The minute you try and control something which is naturally spontaneous I think you defeat the objective. I've seen for example where informal traders have now been harassed by shop owners for example, so they now shoot off and have to go somewhere else. They then create a place for informal traders to go and trade so you're now formalising an informal set-up and it normally fails. So, I think what's gonna happen increasingly in SA, as government fails, as the rate of state failure accelerates, my hypothesis is that the state is failing. So, under state failure scenario, what I've observed for example in Zimbabwe, as the state has failed in Zimbabwe, all that's happened is that the informal sector has adapted very rapidly and its done its own thing irrespective of the state. So informal sectors exist despite the state not because of the state. And I think that's been my conclusion after watching these things for 40 or so years.

- 8) Looking at Infrastructure, and looking back at the 1992 droughts as well, a few people that I've spoken have alluded to the fact that had the major dam in cape town been constructed in time as and when the planning dictated then the city of Cape Town could perhaps have lessened the severity of the recent drought period, is this so, what can be done differently in Johannesburg to avoid a day zero scenario?

Anthony: it was widely known within the water resource management professional sector that the Berg river dam built in 2009 would only provide 10 years' worth of relief for W Cape. It was widely known at that point in time, it was accepted as such, there's gonna be a lot of finger pointing. Bottom line is that the W Cape has outstripped its water supply, population growth has outstripped the concept here I think you should consider is what is known as the hydraulic density of population,

also known as the water carrying capacity or the water scarce indicator, defined by Marlon Falkenmark. It's a difficult number to calculate but nonetheless the whole idea of hydraulic pop density is in my view a terribly important issue for the whole of SA, even SADEC. Because in the western Cape in particular the pop growth has simply outstripped available supply. So, unless you start desalinating sea water, where you start actively recovering water from sewage then I'm afraid you will get increasing problems in the Western Cape. Gauteng is on a similar trajectory but because we've got a little more resilience in the sense that we get water from multiple dams and river basins that feed into Gauteng, so we haven't really felt it yet. But the mathematical calculations are all showing that our water stress or our water resilience is decreasing and for example I've recently done a study for a commercial client a real estate developer in the Midrand area, and we've demonstrated there mathematically that your uhm, reserve supply in the system in Midrand is 18 hours of buffer capacity and very soon it's gonna be down to 16 hours of buffer capacity, now that's not much at all. We advised this client to engage with JHB water to co-invest into reservoir capacity etc. but that tells us that even though Vaal dam is full right now, the buffering capacity which is a mathematical calculation done by engineers and the public is completely unaware of that. It's of great importance to urban planners and I think that you're already seeing in Gauteng the loss of resilience but hasn't been manifest in public.

- 9) What is the value of public-private partnerships in managing the water crisis? I mean the private sector certainly has interests to protect?

Anthony: I see no future for SA unless there is private investment into the water. So, the answer is that we have to have private-public partnerships, we have to do that. And the reason is simple, the economy at the moment we've got 24 million born frees' coming into the economy over the next couple of years, we have to grow the economy by at least 6%. In 2015 SA transitioned to a net negative foreign direct investment in 2015, so SA in 2015, in this book of mine I argue that 2015 was the year of victory against white monopoly capital, that's the year the war was won. White capital monopoly is defeated, it's gone it has left the country. Now you've won the war, how are you gonna feed the 24 million born frees, how are they gonna come into the job market and get proper meaningful opportunities? That's why I say we are going to have another revolution unless we get this right. But at the same time, you must remember that the current unemployment levels in SA are almost double what America, what America faced during the great depression, double what America faced. So, with your economy now having been vanquished in 2015 with the war on white monopoly, we have now got a decline in taxation going into the fiscus, so how are we gonna pay the civil servants, Eskom workers on strike now, how are we gonna pay? Just this morning I've been informed that the bartender in parliament gets 24000 Rands, a researcher that works for parliament gets more than a million rand a year salary. This morning came a public announcement of salaries of civil servants. How can we afford to pay these civil servants when there is no flow of taxes coming in? the economy is dying and were leading to a situation known as a fiscal plif which means that your expenses on salaries for civil servants exceeds the ability of the taxes to collect. That means that you're gonna have a revolt by civil servants so unless we've got 2 choices. The one is to go to the world bank and ask them to help us, then will implement what they call structural adjustment and the first thing they'll say is cut 30% from your wage bill before we help you. So, fire or retrench 30% of your civil servants or reduce their salaries. Of course, that's gonna trigger a backlash. The alternative is that we go the public-private participation route. But now the challenge is how is government going to incentivise private capital, having just been vanquished, destroyed in the war on white monopoly capital, why would that capital come back into SA now? Under what circumstances? When land can be nationalised, when you've got no justice but rights, why would you bring your capital back?

10) I want to know if you think SA is potentially in a lock-in, I'm asking this because of the concept of path-dependency, how water has traditionally been viewed and managed, by the apartheid government, and then also by the democratic government?

Anthony: path-dependency, yes, I think we are. And that's why we need visionary leadership! That is why I think I can make a reasonably accurate prediction that we've got a better than 50% probably 80% of confronting a radical transformation in SA and that will be another revolution that might not be what everybody wants. People might talk about it, especially young people and when they get what they wanted it might not be what they want. I'm taking here about hyperinflation, Venezuela, Zimbabwe, might not be what you want. So be careful what you wish for because it might be an ugly thing!

11) Paradigms help us to define problems, but in so doing the solutions to these problems are somewhat pre-selected, looking at global north paradigms such as IUWM, do they actually have a place in SA where the context is almost completely different from the places these paradigms originate?

Anthony: Are you an urban planner?

Thandeka: No, I am just studying planning but I wouldn't say I am just yet.

Anthony: Ok, I ask because... are you familiar with the water resource background like IWRM, you know about all that stuff?

Thandeka:

So in the IWRM discourse are you familiar with the Dublin principles?

Thandeka: yes, there's 4 of them

Anthony: Yes right, there's 4 principles and one of them is that water is a scarce and finite resource. Now I say that is 100% WRONG! That is wrong. Because that is based on a flawed western based assumption, I don't want to sound like a radical African that talks about our colonial past but its based on the assumption that fresh water is 2% of the total supply of water on the planet. Only fresh water is first it's not vulnerable, very resilient actually because people screwed up, but that's based on a Victorian assumption that water is a stock. And its not. Water is a flux that moves in time and space. So that paradigm, the paradigm we need for SA, I'm beating my drum about the paradigm of abundance. We base all of our management up to now, on a book that was published in the 1850's, in the 1870s on water as a finite and scarce resource, water as a stock. Ok. And actually, water is a flux, its potentially an infinitely renewable resource so unless we change our paradigm, we need to change our paradigm in urban planning, urban design etc. That water in fact is a flux, is not finite. It is an infinitely renewable resource, we can therefor plan design accordingly and actually manage our way out of this. So, what I'm saying is that the paradigm of scarcity is taking us into a pathway of destruction. What we need to do is manage water demand or build new dams, that's all we know how to do. We can't do anything else. We have to go to the paradigm of abundance which is now about building more ecologically resilient infrastructure, what's the word... Nature based solutions. The whole thing is working with nature rather than against nature that's where we have to go with this new paradigm of abundance.

12) Do you think we as a nation or policy makers and such are cognisant of the fact of incorporating more natural infrastructure into water management and restoring ecosystem services which we benefit from?

Anthony: the simple answer is no. We talk about it, publish papers and such but there is no evidence of it all, absolutely none?

13) I think most efforts towards such are at project level and so I guess then there is not much more effort to expand these to larger scales

Anthony: you are right.

14) In the discourse in South Africa today, there is a certain rhetoric at referencing the past as an explanation for problems that are present-day realities. What lessons can we learn from the way things were done in the past to shape present and future actions pertaining to water resource management? I feel as though people only consider water the moment it comes out of their taps, politicians and normal citizens alike

Anthony: we need to have a conversation about water as a great economic enabler. We need to think about water and the economy, not only water and the human consumption. We have this fixation about drinking water and how water must be free, we can't privatise it and all that ok, water is actually the hydraulic foundation of the economy and the water-energy-food nexus is a very important conversation. When you start having people of your calibre in the future, you are one of the future leaders, the future speakers. So, if we start talking about this, its water for the economy dummy! Get it right, its all about the economy, the economy stupid! Get the economy right, you can't eradicate poverty by giving poor people water. Eradicate poverty by giving people access to decent jobs, that's how you eradicate poverty.

15) The skills/knowledge/expertise gap in SA> Most experts are either reaching or are retiring, there is an apparent vacuum to be filled and ware we ready to hand over the reins to a new generation of experts?

Anthony: I'm very encouraged by the younger generation, Whenever I've met younger people, I've always gone away from that with a sense of awe and amazement. Young people constantly amaze me, how innovative, you know your generation is tech savvy. You touch a telephone and you can talk to the world ok. So young people, I think are actually gonna do a better job than the old folk did coz we screwed it u quite badly. One of the reasons why I engage with young people so vigorously is exactly that, the skills and knowledge transfer and there's a, I've got a personal policy in my life, you know the movie Charlies Angels, there was a movie series. So, I'm Charlie and I have a whole bunch of angels. You are one of them ok. I have empowered hundreds of young people such of yourself, they've gone out, all over the world, Obama's administration, studying at oxford, all over the world today, it's the multiplier effect of transferring skills and knowledge. They have ultimately inspired me than me inspiring them, they are hungry for knowledge, willing to embrace change. In your lifetime you will see people attempt to colonise mars! In your lifetime. In my lifetime I was amazed by the first man who was gonna be put on the, moon and be brought back

Anthony: You are going to see amazing changes, driverless motorcars, artificial intelligence and things like that. Its gonna increasingly make human beings redundant, so poverty and irrelevance of human beings is gonna accelerate in your lifetime. These are going to be great challenges so unless we get our thinking right, its gonna enter a festering cesspool of seething discontent and revolution, are we going to become more compassionate and caring for our human beings, we have too much poverty in the world and where is it all gonna end?

Thandeka: Thank you very much, it's been such a pleasure engaging with someone of your calibre.

Anthony: Its my absolute pleasure, I'm the one who's honoured when erudite young professionals such as yourself.

## Interview 6: Dr Nick King

Profession: Independent consultant in global change, futures visioning and strategic planning. Nick King has over 25 years' experience in the global change, environment, biodiversity, policy, planning and development sectors. His expertise encompasses futures research, global change analysis - in particular environmental change including climate change, scenarios development, systems and resilience thinking. He has extensive experience working with governments, the private sector, NGOs and local communities in multi-stakeholder coordination, strategic planning, change management, and conflict resolution.

Date: 20 June 2018

Time: 12:00:00 h

Duration: 00:43:54 h

- 1) The water crisis in the country, to what extent is it a natural disaster, and to what degree is it a lack of preparation in terms of applying governance measures and administration as well?

Nick: Uhm, Thandeka look, its not a natural disaster per say, it's a definitely related to climate change. We've seen bouts of extended droughts around the world etc. and we've known about this for a long time in terms of climate projections, climate change projections and so forth. SA has a very scientific based knowledge, involved in the IPCC and all the rest, the universities and CSIR. And so that in and of itself, and it relates to some of your questions later is that we haven't really taken these climate change projections seriously. Outside of the department of environmental affairs who's being tasked with doing mitigation scenarios, adaptation scenarios and so forth but, for the rest of the country its just something that happens elsewhere or to other countries or its just a extreme weather event. But the is very little cognisance of the long-term changes in temp and so forth. So, it thin k to one sense its not a once of natural disaster. Historically we had wet and dry cycles, 7-18 years of those cycles. We will still get some of those cycles but of course its not along a flat average, that is sort of now inclining up and all the rest. Uhm, its there's both that aspect of it, and to what degree it is a lack of preparation absolutely it's a lack of preparation you know. For the semi-arid country that we are, we've had projections just excluding all the climate change ones for a long long time saying that our current usages, with pop growth, urbanisation, blab la bla, we're going to run out of water approx. 2020-2025. So if I go back to... I worked at CSIR in the 90s we did the first state of enviro for SA and them these projections were all there. SA's enviro outlook in 2006/7 the chapter on water made these predictions that by 2025 we would have used up all our water in the current scenario and that sort of thing. You know there's been no cognisance of a need to change our approach and we continue saying ag we'll just continue building our dams...

Thandeka: So it's business as usual type

Nick: Absolutely, and you know dams are not an appropriate technology for tropical/ south tropical countries, that basically a northern temperament, a solution for countries that have cool temperatures, that have snow melt in the mountains, that runs sort of all year round, they have these deep steeped sided valleys so your surface to volume ratio is very small. If you compare that to Vaal Dam, the surface to volume ration is ridiculous water that's lost to evaporation and that sort of thing. So, we just continued with this mindset that we'll just build another dam somewhere And we really haven't done all that well compared to other arid countries such as Israel, The UAE, Oman,



etc, where they've invested heavily in desalination. SA has 3000 km of coastline, we shouldn't have a water crisis.

- 2) Thandeka: you just mentioned now that its basically not being taken seriously, what do you think then has to be done for people to wake up and say this is a serous issue we're facing you know? Because I feel like water is something that people perceive to the extent where if you turn in the tap and water comes up then everything is ok, for normal citizens and politicians alike?

Nick: I think you're absolutely right, that sort of flush and forget syndrome, we shower, flush our toilets drink water but nobody sort of thinks what happens. So I think the, what's really lacking in SA at the moment, and its not necessarily a criticism per say because with our past and the change of government and all, socio-economic needs, very high unemployment figures and everything is focused on the short-term but there's a very real lack of, from my understanding , where I work and what I've experienced, of any serious long-term scenario development, futures thinking and so on, outside of research institutions maybe and think tanks, so really at the national level govt, planning institutions and so on. If we look at the NDP 2030, I mean there's mention in there for example that water will be the area where we're hardest hit with climate change were gonna have to make some serous trade-offs around water. But that does not translate into, ok what are we going to do, how are we going to sit down and go with representatives of each major sector in the country and say listen guys, there's not gonna be enough water for us to continue the way we have so where do we put manufacturing in the country, that's water intensive, uhm where do we build facilities whether they are dams or water uhm sanitation or, I mean desalination, or the ground water recharge processes and so on so that we have water where we need it most. But mostly we need to shift our water intensive uses to where there is water. Those scenarios obviously need to look at things like pop projections to 2050, 2100 because we talk about a need to invest in infra and its not going to be short term and we don't want to invest in infrastructure that's just going to become a standard asset going forward. So I really don't see anything like the level of strategic thinking, scenario planning and so on, around particularly water because it is our most limiting and constraining resource, it's the one, you toss climate change into that mix anyway for a semi-arid country, water is the real critical issue. And again, with a 3000km coastline we really should not have this problem.

- 3) The current situation, it has been a long time coming and I'm sure experts such as yourself can agree with that. I understand that you cannot prevent nature from taking its course, but do you think more could have been done in the years leading up to the 2014-16 drought period to better prepare us?

Nick: Absolutely Thandeka, and I mean your sort of lowest hanging fruit if you want, is water efficiency. Getting people to reduce reuse, getting people to innovate around dry technologies. We use so much water in an incredibly wasteful way in SA and I think it comes from a sort of the past where the water supply infra which you know was world class, no question about it. But it only served 10% of the population so there was more water than that 10%, the white population could actually utilize. Its all used to spray gardens and hose down driveways, there was no limit to the water for the people who were being supplied. For people who weren't supplied by the infra with 1 stand pipe per 1000 people, no flushing toilets. They weren't using water and there was not enough water because that's not what the system was set up to deliver, but so we've retained this mindset I think, amongst the captains of industry if you want a better term, that there's unlimited water and we can use it in any way we want, we can spray, irrigate whatever. Hoe on earth do we allow spray irrigation in SA? Its absolutely criminal. So, you know from a national policy framework, we should

be regulating against that type of use right across the country and insisting on water use efficiencies, from business, agriculture, every sector and including at the household level.

- 4) The water crisis is quite unique, unlike an energy crisis where you have alternatives, you can get a generator use gas or whatever the case may be, but there is no alternative for water, this brings me to the issue of waste water treatment and recycling, why is SA not taking advantage of this and using treated waste water to augment water supply to agriculture and industry for example?

Nick: uh, Thandeka, absolutely and I think it relates to what I was saying about the mindset of the country having unlimited water. It's crazy I you think right next door a country like Namibia, they have been recycling at world class facilities for 30-40 years. I don't think we have an example of decent recycling anywhere in SA. It just hasn't been on the agenda because we've had this 20<sup>th</sup> century massive infrastructure engineering approach to the use of our natural resources. It relates a lot to SA's mind set about our mineral wealth, is that there's this massive un tapped natural resource and we just need to engineer our way to exploit them, that mind set comes across in almost everything we do, from our fish stocks to agricultural production, everything we do is just to exploit with no limit and I think we really really haven't had a reasonable and rational look at the set of limitations in our natural resources.

- 5) During the previous era of government, it was believed that most water related problems that arose could be solved through proven technical measures, that water shortages could be averted by building large storage dams, but in this day we have moved from the technical to a more communicative rationale with a lesser focus on technical measures and discourses are a norm, would you say that water management paradigms such as Integrated Urban Water Management (IUWM) are enough to augment or even replace (as some authors suggest) robust technical measures from here on out?

Nick: so, I think its quite a complex uhm, answer I suppose, uhm I do think there's room for IUWM, very much so. I do think that we cannot just adopt it carte blanche because SA has very different circumstances to the developed countries in the north, we need to look at how we can customize it by bringing in sort of the knowledge and expertise from semi-arid to arid countries who have also been dealing with these problems. Its very much a case of horses for horses, is that like we adopted a massive dam engineering approach, not suitable for our country so just adopting IUWM is not the right way to go but there are some components of it which are very useful. The idea that we currently have which is that any rain which falls on a city we channel it away and as fast as we possibly can to storm water drains and such, then we go build dams 50-100s know away to catch the rain and bring it back to the city. I mean it's a completely Ludacris picture, that's coz we don't look at these resources in an integrated way. I think there is a definite place for IUWM and principles contained in there, but we cannot just simply adopt it carte blanch and that's one of the problems. Its also got to go with a more integrated planning approach to urbanisation totally. It's not just about water management, its also about energy management so how do we make cities totally self sufficient in energy generation through renewables, totally self sufficient through water catchment of rain that falls, more porous surfaces. How do we make food security through urban gardens, all of those things? So again, it's great that we simply cannot afford to look at these things sector by sector like we have in the past.

- 6) Paradigms help us to define problems, and in so doing the solutions to these problems are somewhat pre-selected, looking at global north paradigms such as IUWM, do they actually

have a place in SA where the context is almost completely different from the places these paradigms originate?

Nick: yeah I also couldn't really help you with that, I'm not aware of any particular practical example, not even if its working but even being tested you know.

- 7) Looking at possible future scenarios, as it stands, its estimated that with the current user patterns SA will remain water scarce until 2025, what do you think is the most plausible and most likely scenario for South Africa, in terms of water resource availability, considering the almost lacklustre implementation of our water policies?

Nick: uhm ok, so I'm not quite sure where that sort of estimate comes in that we will remain water scarce until 2025 coz it suggests that after that we won't have a problem. The scenarios currently are that yes, we are getting a bit of rain now and so on but 4 years of below average rainfall, you will need 4 years of above average to compensate for that and that's very unlike to happen. So, you might get 1 or 2 years of above average rainfall but overall the temp is already up 1-degree from what it was historically, getting these more extreme events. SA is one one of those countries that have been one of the earliest hit by these long term climate change impacts. Its not so much in the extreme events but because we are semi-arid its starting to show up where it will impact the most. The uhm scenarios going forward to I think very much are going to mean this need for scenario planning and I think we are going to see a very rapid decline in agriculture across the country or at least irrigated agri. Because we simply won't have the water to irrigate agriculture, we are going to need that water for people and then obviously for key industry sectors and that sort of thing. And so, we gonna have to make some pretty hard decisions as a country around what it is were going to choose as a developement path going forward. It can't be carte blanche where everything is an option. We are actually going to have to say we can no longer do water intensive agriculture, we can no longer do water intensive industry. So you know we have these now in the NC these centres for wine growing and citrus in the orange ricver... that's absolute madness, citrus is hugely water intensive and so on, its insane. Uhm I mean just an anecdotal thing is the saying that the NC was that you could get small loans for men to start car wash businesses and ladies hair dressing businesses! What's the resources that both of those need???

- 8) Because the focus of my research is on urban water management, and considering the setup of most urban areas, with your well provided for suburbs and then townships, in terms of water service infrastructure, what is the future of informal settlements, will it always be a reactive sort of process where local government cannot anticipate or keep up with service demands?

Nick: my take on this and I just been recently doing a review for sp uhm, Thandeka my take on this, and I've just been recently im doing a mid term review for the sustainable cities initiative. They working with a number of African cities on what their calling the urban natural assests programme and they've started on rivers, particularly where in most African cities the rivers are really just completely mistreated as sweres waste dumps and whatever. And actually, they need to be cleaned up and biodiversity enhanced, prevent flooding and such. Virtually all of these cities that were working with, is that the planners are basically sort of saying that they can no longer see these informal settlements as unplanned areas, they can only view them as un-serviced because their expanding so fast and even if you did go and bulldoze all the shacks and everything, by the time you come back with your plan people have rebuilt you know, then there's more people. So, these long-term trajectories on not just pop growth per say, which we know in Africa the pop is projected to double from 1 to 2 billion in the next 30-50 years. But there is also massive, migration happening

which is being exacerbated by social and political conflicts, people can no longer be subsistence farmers, so they move to the cities. So, this absolutely incredible increase in urbanisation is simply swapping planning processes which is still guided by lengthy desktop studies. The whole planning process is just being completely overwhelmed by the demographic changes.

- 9) Building on the previous question, the concept of resilience has become quite popular in the last decade or so. Looking at urban areas as systems, would you classify them as resilient to the unpredictable consequences of climate change?

Nick: No, I would say that Joburg is probably a classic example of, probably a city that may well end up being abandoned because if you think of where its placed, the whole uhm and its Southern Africa's economic hub, there's industry and manufacturing etc. But its so dependent now on water resources coming from the Lesotho highlands project and that is dependent on continuity of snowfall in Lesotho. Now with cc projections and warming up, if that happens that whole system falls apart and Joburg does not have any alternatives for water. The only options then are to pump desalinated water from the coast. That not such an outlandish suggestion because if you think of a petrol station, if you go in Joburg, you pay 15 per litre, if you go to the shop there you pay 25r per litre. That petrol is all being pumped up from the coast, so we can out in that infra, its only 500km but again that needs to be something which is put into the scenarios development and options and looked at coz that's also long-term investments and we have to put that in place coz then that's also a story of facilities and so on. We really need to look at these things because its obviously getting hotter, Joburg is in the rain shadowed part of the country, it doesn't have a lot of water resources, existing ones are oversubscribed, then there's acid mine drainage which undermines the quality that does exist. Joburg has some very serious integrated challenges to look at. As far as I know I don't see that happening.

- 10) Most of the debates centred around water security consider infrastructure renewal and maintenance for water services, do you think in this sense that natural infrastructure is being overlooked and that there is indeed greater value in maintaining or restoring natural infrastructure, not only for the benefits of people but for restoring ecosystems and functions, from which we also benefit?

Nick: Thandeka, absolutely. I think our mindset is still in the 20<sup>th</sup> century, we really have not taken on board all of these ecology infrastructure, ecology based adaptation, catchment restoration etc. back in about 2006, when we were trying to stop the construction of the steelpoort dam uh, we had a meeting with water affairs about this and said look the Olifants is already over subscribed there's huge pollution from the mines and agriculture, why don't you rather spend 5bil on rehabilitating the other catchment of the olifats which will store the amount of water rather than trying to build this dam at the bottom end of the system. Quite literally the guy said, we build dams. If you want to do catchment restoration you must go talk to the department of land affairs. There's this complete disjoint amongst government departments. When it comes to sort of the integrated resource management, integrated thinking and so on that's the nature of problems from the 20<sup>th</sup> century.

- 11) Being well informed about a certain subject matter is essential when it comes to influencing decisions, trying to get to the core of the issue, would you say that experts have a "loud enough" voice when it comes to consultation and advisory processes in terms of informing politicians and policy makers?

Nick: I think that's part of what's missing, is that a lot of the research and stuff is sort of seen to be in academia and not really practical, but I think there's a bigger problem than that. That's really around

uhm who goes into politics and if you look at I mean there's if you would be its very hard coming (27.54)... Ok uhm so it is important to get a bigger voice for experts and greater consultation and so on, the problem is the people their talking to don't necessarily understand what their being told. You look at all the negotiations under the cc convention, biodiversity convention etc. the political negotiators don't come at it from a from their expertise, they come at it from and economic and political perspective, were never gonna solve these problems if that's the attitude of the people around the negotiating table.

12) The Department of Environmental Affairs (DEA) had been developing climate adaptation strategies. Due to the intricate link between climate change adaptation and human development, various role players (the tiers of government, private sector etc.) continue to build the country's resilience to climate change, although operating without a common reference point, and consideration of cross-sectoral implications on resources to support the future we want, how detrimental is this lack of coordination and fragmentation to the goals of adaptation strategies?

13) In your professional opinion, would you say there is a theory practice gap in terms of implementation of what is put on paper by researchers and academics? I think that there are tremendous efforts carried out in terms of research but how well is this theoretical knowledge being put into practice, are project-level developments enough to translate this knowledge into reality for a far bigger scale than project level?

Nick: so, I would say absolutely there's a complete disjunct there Thandeka, use the example around coal fired power stations. We have fantastic climate in the country, participate in IPCC, done all these projections about what's gonna happen. The energy research centre at UCT released a report recently about the cost of these coal power stations which have been approved, those are gonna cost us something like 20bil if we role them out and their gonna compromise everything that we're doing in terms of our mitigation to meet our commitments under the Paris agreement and so on. Yet it gets no traction with politicians, so you know the same thing is happening with water, as I said 20 years ago we were saying to national govt we have a problem, we a semi-arid country, if we continue using water the way we do, irrigated agriculture and so forth, by 2020 our total uh exploitable resources will be overexploited. Got no traction. They don't actually understand natural systems, resource constraints, the fact that these things fluctuate, they come and go. Let alone throwing climate change in the mix. There's a huge issue around what's happening with research, tremendous effort, good work research centres more and more are established and putting up work, but I just don't think people in politics, the world over from Donald T down understand what their being told you know.

14) In the discourse in South Africa today, there is a certain rhetoric at referencing the past as an explanation for problems that are present-day realities. What lessons can we learn from the way things were done in the past to shape present and future actions pertaining to water resource management?

Nick: So, I think that the biggest lesson is that we need to understand is that the way the way we've approached things in the 20<sup>th</sup> century was that it was an infinite planet with infinite resources, we could engineer our way through everything and there was no problem, now we are starting to understand that not only is not true, its not necessarily criticism. It was only once we got into space that we could actually see how finite the planet is, through satellite images we can see how things change with cc and all that. So now that we actually have better info and we can get better info and so on, we need to understand that what we used to do is not going to help us in the future, yes, we

benefited hugely from the use of ff, we have to understand now how damaging that is in the long run. One of the things we have to do in the future is get away from infrastructure build centralised parties. When they fail the system collapses. And the other thing is that you know with cc we are entering an era that we have never experienced before, we just don't know. So, you know the stuff we've learned from the past does not pertain to the future. We do water resources planning on 100 years of mean annual runoff rainfall figures in a river, so we go we can tap x amount of water bla lah, those figures are irrelevant going forward into the future. The historical facts won't help us in the future. You look at every university has a history department; how many do you know that have a futures department? We spend so much time looking backwards but we do very little work looking forward, which one is more important? You know obviously I'm not for one moment suggesting that we shouldn't learn from the past, that's only part of the story, if we are gonna learn from the past, what are we learning for, we are learning for the future, but do we know anything about it or are we going forward blindly. Its like we are looking back at the past and walking backwards into the future without looking at where we are.

Nick: I really do think that the most important thing that needs to happen at all levels of govt, is this sort of scenarios processing, and say look we know we have a crisis here, we need to understand that there are gonna be cc impacts, demographic changes and all these things. We need to take these things on board and look at what are the possible options for the Joburg metro going forward, some of these are going to be uncomfortable decisions. You got to get everybody in this process to not have push-back by people who will feel excluded. If we are going to talk about the future options for water in Joburg, we are also talking about where people gonna live, how are we going to assure food security for a metro like Joburg if we can't have water for irrigated crops. That sort of thing. So, it's not just about how we are going to get enough water for Joburg coz the immediate response will be build more dams, ta into the ground water. It will be a technical approach and what we need is this sort of socio-ecological approach, what does the system have in it that we can tap into, how many people are we trying to provide for and at what level etc. once you've got that on the table you can then say we have 1 or 2 options and the others we have to curtail manufacturing in Joburg for example or whatever it is coz we simply don't have that water.