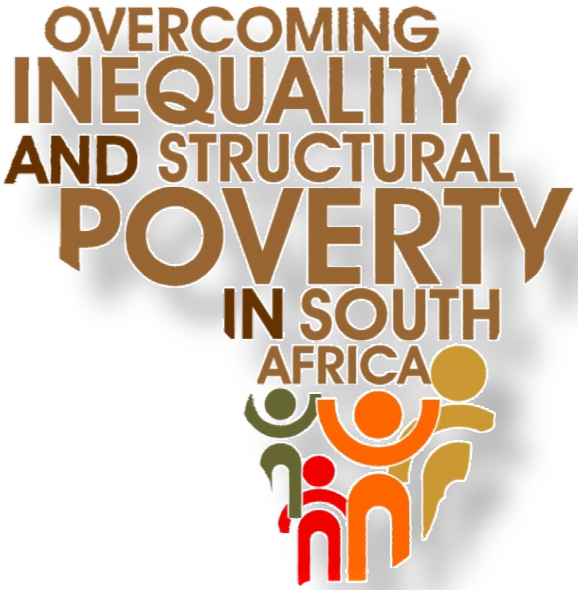

Resilience and response-ability: Towards just water service provision in the context of climate change

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Abstract

Climate change will impact on water service provision, yet it is not integrated into water sector policies and plans. This paper unpacks some of the reasons for this disjuncture: the complex and overwhelming challenge of universal water provision even in the absence of climate change; and the real threat that climate change poses to predictable water availability. Current climate change response policies and practices fall short of what is necessary and also threaten to deepen social inequity. Without considered intervention, climate change impacts on water provision will exacerbate social stratification and inequality, making the lives of poor people harsher and even more marginalised by further limiting access to quality water and sanitation services that are necessary to support a safe, healthy and dignified life. The paper argues that shifts need to happen at both personal and structural levels to build effective resilience, and suggests interventions that could facilitate these shifts.

Keywords: water services; climate change; resilience; participation; governance

1. Introduction

People living in South Africa's urban settlements are highly dependent on the state to provide sufficient clean water for their health and well-being; moreover, this is a constitutional right. Yet the state cannot be depended on. A combination of weak capacity and policies that target quality services towards the wealthy, means that poor people remain marginalised and do not receive water of adequate quality and quantity to meet their needs, uses and expectations. Thus poor households experience structurally-induced water scarcity. Compounding this are predictions, particularly in the winter rainfall regions of South Africa, that human-induced climate change will lead to reduced rainfall, surface runoff and groundwater recharge, and increased evaporation. The capacity of the state to respond to these challenges is weak; community expectations that 'the state will provide' are likely to be frustrated as governments become less and less able to respond. Yet without considered intervention, climate change impacts on water provision will exacerbate social stratification and inequality, making the lives of poor people harsher and even more marginalised by further limiting access to quality water and sanitation services that are necessary to support a safe, healthy and dignified life.

Resilience building and addressing social water scarcity are presented as a framework for developing an appropriate, humanitarian and environmentally-sensitive response to climate change.

The authors work for Environmental Monitoring Group (EMG), a non-government organisation (NGO) that has been active on environmental justice issues for almost twenty years. This paper draws on our active participation in the sector in trying to engage with government, supporting community initiatives, outreach and education. It also draws on specific action research that has been done with communities within the City of Cape Town in relation to water leaks, household water bills, sanitation in informal settlements, water management devices, water tariffs and the integrated development plan; and on a series of 'water and climate change' seminars that have acted as focus groups over the past two years. Details can be found at www.emg.org.za. Working for the past ten years with the Western Cape Water Caucus, a network of NGOs and community based organisations that care about water has been particularly helpful in understanding the changing dynamics in the sector.

2. Building resilience to climate change and tackling social water scarcity

In ecology, the traditional idea of resilience relates to the amount of time it takes to recover from a disturbance or shock. This perspective on resilience considered natural systems as separate from human systems, and was seen as a linear phenomenon – ecosystems had greater or less capacity to bounce back from disturbance, and relieving pressure on an over-utilized ecosystem was all that was needed to allow it to recover. More recent ideas about resilience in socio-ecological systems (for example Scheffer *et al.,* 2001; Berkes *et al.*, 2003; Gunderson and Folke, 2005) view human dynamics and actions as central to any ecosystem. They define resilience as 'the capacity for renewal in a dynamic environment'.

Key elements of this understanding of resilience are:

- the importance of decision-makers or 'managers' in the ecology context responding to change in an informed manner;
- the idea of a 'buffer', so that different approaches can be tried, adjusted, and tried again, with the space and openness for learning and change;
- the necessity of trust and co-operation between 'stakeholders' in order to build resilience;
- the importance of governance institutions that are able to learn and be adaptive and imaginative.

For our context – water services, climate change and poverty – we are considering what is needed to build resilience, within households and communities of poor people, and within the institutions of water service provision, in order to withstand the severe disturbances brought about by climate change into an already ragged and disturbed system. We argue that some of the things that are necessary to build this resilience are:

- openness to learning, being more informed about reality, rather than trapped in rhetoric or denial;
- trust and co-operation, within and between 'communities-of-practice';
- the ability to see clearly what is in one's own power to do, what is a result of structural set-up, and understanding what is required to bring about change in both.

Social water scarcity is a combination of structurally- and environmentally-induced scarcity. It is the perception by households that the quality and quantity of available water is inadequate for their needs, uses, expectations and aspirations (Tapela, 2009). Historically, power relations have created structural inequalities in the allocation of water resources and services and so deepened social scarcity of water

particularly where there is already environmentally-induced scarcity. It could be argued that increased climate change-induced scarcity will also deepen social scarcity of water given existing structural inequalities.

3. Climate change and its impacts on water service provision

The impacts of climate change predictions on water service provision are by no means obvious because they are not directly attributable to shifting weather patterns. Changes to water resource availability through changes in rainfall patterns, surface runoff, evaporation rates, groundwater recharge, water quality and so on, lead to secondary impacts on the costs, technology choices and institutions of service delivery, all of which affect the quality, reliability and affordability of households access to water. At each stage of this causal chain, interventions can be made to alter the severity and nature of the impact. That hydrological cycles will change is certain, but the scale, variability and location of that change are difficult to predict.

The Intergovernmental Panel on Climate Change projects a decrease in runoff of 10-30% in southern Africa and a decrease in groundwater recharge, due to changes in the timing and quantity of rainfall (IPCC, 2007). The 'hotspot' in South Africa is the winter rainfall area in the Western Cape, where 5-30% less rain could fall during winter and autumn with dramatic implications for water provision and farming. Decreases in winter rainfall are predicted across the country; whereas summer rain could increase making especially the northern and eastern parts of the country wetter. The transition zone between winter and summer rainfall is one area in particular where it is difficult to make specific predictions but where farmers are already experiencing changes.

Wastewater treatment plants and other infrastructure are vulnerable to damage from storms, mudslides and rockfalls. Municipalities are not meeting water quality targets at existing treatment plants – maintenance is poor and there is insufficient capacity to treat the volumes of waste water that need to be treated (DWA, 2009).

As available water sources become less reliable, as is likely in the Western Cape, more remote or alternative sources will need to be considered. The Department of Water Affairs (DWA, previously the Department of Water Affairs and Forestry, DWAF) has prioritized 'diversifying the water mix', by relying

less on surface water sources and increasing the use of groundwater, treated effluent, and desalination (DWAF, 2005). These alternatives often carry much higher energy and financial costs than existing bulk water resources (Griffiths-Sattenspiel and Wilson, 2009).

With current strategies in place an increase in the cost of water will lead to an increase in its price for domestic users and potentially greater competition over access to water. This is compounded by the fact that climate change will impact not only on water, but on many other aspects of the economy and people's lives. The transition to a low-carbon economy is unavoidable and deeply beneficial in the long term but there will be transitional costs associated with it. Paying the full social and environmental costs for fossil fuels means that energy won't be nearly as cheap – food will be more expensive to transport and deep shifts will need to take place in the currently largely unchallenged systems of production and consumption, with implications for employment and income. Without safety nets and strong government or community intervention, people's lives will be harder. Municipalities too will struggle to find the resources they need to provide ongoing service provision.

We can expect that the many existing fault lines within water services will be deepened with the increased pressures of climate change.

4. Fault lines in domestic water provision and access

South Africa's constitution guarantees all the right of access to water. Policies and plans have been put in place to make this a reality, including Free Basic Water, massive roll-out of infrastructure, and so on. Yet water and sanitation services are not provided to all people equally – the level of service you receive depends on your ability to pay. The intention to move people up the water ladder, as articulated in political speeches and policy remains a dream; service levels are not improving and households are experiencing social water scarcity.

Official numbers of who has access to water are contradictory and almost impossible to verify. For example DWA estimates that 94% of people have access to infrastructure, but also that 14% either have no access or access that is below basic standard (DWAF, 2007). Access to infrastructure is itself obfuscation; it does not necessarily imply ongoing reliable service provision.

Since 1994, government has focussed on rolling-out services to get rid of the backlog (i.e. those with no infrastructure). While this has laudable intentions, it has not been combined with sustaining those services, and a second-order backlog is emerging, which is not visible in the official statistics. When a water connection is delivered to someone's house, the backlog is reduced by one. When that water connection fails (e.g. through poor maintenance) no addition is made to the backlog – at least on the books. In reality, the household is no better off than they were before the connection, and might even be worse off as their area is no longer counted in the backlog to be serviced and their pleas for decent service delivery are ignored. This second-order backlog is caused by poor maintenance, lack of spare parts for broken infrastructure and the terrible quality of plumbing in new government housing.

Prepayment metres, water management devices, tricklers and other water-limiting technologies are installed in many poor areas, frequently with negligible informed consent. They are designed primarily to stop accumulation of household and municipal debt. Social water scarcity is exacerbated because they are installed only in poor areas, have high levels of technical failure, and limit supply in a way that is disempowering and difficult to manage.

Pricing also compromises access to sufficient water, particularly when there are steep tariff curves and many people share a single connection point, as with back-yard dwellers and large households. For many, water is just too expensive. This is especially true when waterborne sewerage is the only option; and waterborne sewerage is the promised and aspired for option. Nevertheless, for homes on limited or no income, paying for water to flush the loo is prohibitive, and many people are not paying. This has a number of consequences. At one level refusing to pay for water is an important form of resistance, a way of wielding some power in a situation where people otherwise feel powerless. Yet an inability to pay also leads to high debts – and for many, further feelings of despair. During a community-initiated project on water leaks in 2004, members of the Western Cape Water Caucus collected household water bills in Khayelitsha. At that time, the highest arrears witnessed was forty-three thousand Rand. This money was owed by a household in one of the poorest townships in the City; a sum so large that it could obviously never be repaid. Yet month after month, interest on the unpaid bill compounded. Being in such high debt is extremely stressful and makes a whole range of other social interactions harder. For example one woman didn't register her child at the local library because when the library asked to see the woman's water bill she believed that the request for her child would be refused as she was thousands of Rand in arrears.

Housing backlogs exacerbate water problems. The expectation (and promise) is that everyone will get a serviced house, and that people will move from informal settlements. Fifteen years into democracy this is looking unlikely. Informal settlements are growing faster than houses can be built yet they are still seen as "temporary", and therefore to be supplied only with temporary or emergency services. Services in these areas are often below basic standards (see for example Goldberg, 2009). Yet for people who get a house, problems are not over. Poor plumbing and higher levels of water service – piped into yard or kitchen, flush toilet – bring new and unexpected costs to the first time home owner; costs that are often prohibitive on limited or inconsistent incomes.

The consequences of substandard water and sanitation provision are also unevenly distributed. Insufficient water, poor quality water, stagnant pools of grey and black water all provide fertile ground for disease and ill-health. Those without access to clinics, hospitals, clean air and with weakened immune systems due to chronic diseases, malnutrition and so on are more vulnerable and therefore need to receive better services not worse.

The difficulties people experience with service delivery are exacerbated through poor response time by municipalities and fractured relations between people and their local authorities.

5. Responses to climate change are problematic or non-existent

Climate change has not been ignored by government and mention of it fills many preambles and political speeches. But, at least in the water sector, the rhetoric has not reached budgets, operational strategies, planning or implementation in any meaningful way. Furthermore, only the most obvious, direct impacts of climate change on water resources and infrastructure are being thought about, while the inevitable impacts on water services, water financing and equitable water access are not being considered.

To a certain extent, water demand management (WDM) and water conservation (WC) strategies can be seen as a proxy for climate change response in the water sector, particularly in the Western Cape where models predict that climate change will lead to reduced rainfall and surface water. The City of Cape Town sees WDM as key to ensuring sustainable water provision. There is a city by-law to enforce certain

aspects of it and a 10-point plan to reduce water demand (City of Cape Town, 2007). Aspects of this could be seen as part of a response strategy to climate change in that it includes reducing leaks and water wastage, equitable tariffs, water-use efficiency and water recycling.

A complicating and problematic aspect of WDM/WC strategies is that there is a conflation between reducing water wastage (saving water) and reducing municipal or household debt (recovering the cost of water provision). Those who cannot pay have their water restricted in the name of water conservation through measures such as water management devices, tricklers, pre-paid water metres and so on. Although there are obviously good reasons to save both water and money, when water demand management is confused with debt collection, and is carried out in ways that many people experience as 'punishment for being poor', the mistrust and anger that people feel towards the government deepens, and spaces for real collaboration and sharing of responsibilities close down. Targeting poor households as the first port-of-call for water conservation exacerbates deep inequalities in our society, not only because of day-to-day struggles with insufficient water, but also because allowing only rich people to have flowing taps and flush-toilets entrenches class divisions and thwarts yet again expectations of working class people to be equal members of society.

Technologies that limit access to water need to be seen in this context and not just what they do or don't do in terms of water conservation and debt management. The City of Cape Town is rolling out water management devices in poor areas at the rate of 5000 per month (City of Cape Town, 2009). In theory, these devices can be set to any daily limit that is agreed between the city and a particular household; in practice they are set to 350 litres per household per day, an amount that might or might not be enough, depending on how many people it is serving, their state of health, and other special needs. Their name is also highly misleading, a form of Orwellian double speak. Water 'management' is not possible at a household level. The device is locked and the metre cannot be read; households have no way of knowing how much of their daily allocation they have used and if or when their water will be cut off. The devices have been installed with no or limited prior informed consent (Pereira, 2009) These kinds of interventions do not deal with the heart of the problem of high levels of water consumption in poor areas, which includes structural problems, lack of ongoing leak fixing (and unusually high levels of leaks due to poor plumbing and materials) and a billing system that is incomprehensible and difficult to engage with should you find yourself in arrears. A pre-paid meter or water management device separates the state from its citizens by putting a piece of technology in between, a piece of technology that cannot be talked to or reasoned with, a piece of technology that puts the burden on poor households to resolve service delivery problems rather than on the state.

In April 2010 EMG facilitated a group of civil society water activists to engage with Cape Town's Integrated Development Plan (IDP) and Budget review process. An analysis of the documents available for public comment showed that climate change considerations have not been incorporated in any explicit way. To the contrary, some of the proposed changes and interventions are likely to exacerbate differential impacts of climate change.

The tariff changes proposed (and now approved) for Cape Town mean that households using 15kl water per month will pay 24% more for water in 2010/11 than 2009/10, whereas those households using a luxurious 60kl per month will only pay 12% more. Under water restrictions aiming to reduce overall consumption by 30%, the situation is even more regressive; those using 10kl per month will pay 10% more, whereas those using 50kl will pay a staggering forty-five percent less. This is not to say that Cape Town no longer has rising step tariffs; it does, but the tariff curves have got less steep, particularly under water conservation scenarios. This is contrary to the imperatives of both poverty eradication and climate change adaptation.

The IDP review process is ostensibly a chance for public engagement, yet it appears to be a sham. None of the comments was taken up, and it was only after numerous phone calls, emails, and letters that we received any response to our comments at all. This was almost four months after they had been submitted and ironically after the deadline for comments on the following year's IDP had closed. The City seems unwilling to accept that a response to climate change – or indeed any local strategy – will not work without citizen engagement and supportive relations between citizen and state.

There are two possible explanations for why public consultation and participation in decision-making does not move past rhetoric (for indeed commitment to it is liberally littered in official government documents), and perhaps the truth lies between them. The first is that lack of consultation is deliberate; it is a means of keeping people marginalised and dependent, a way of asserting and maintaining state power. The second is that local government does not know how to consult in any meaningful way. The mechanisms for public engagement and participatory democracy are absent not through active choice, but through ignorance. South Africa is a young democracy with infinite challenges and the people appointed to deliver are (at best) technocrats with limited understanding of citizen engagement. Thus complex problems are dealt with through 'technical fixes' rather than through a process of consultation.

The response of many cities to growing household debt is typical – mechanisms are sought to stop people owing money, rather than to understand why they are not paying and how this can be resolved whilst ensuring that people can live with dignity and decent services.

6. Research findings from community engagement and action

Through action research in communities and direct activism as members of civil society, we have gained insight into social water scarcity responses. Specifically, we have: conducted household interviews and focus group discussions in areas within the City of Cape Town where water management devices have been installed; we have supported Witsand community, to engage with government on problems related to water management devices in their area; we have run a series of workshops on domestic water use, which included education on leak fixing and understanding household water bills; we have made submissions to the City of Cape Town's IDP and Budget; and we have lobbied the City of Cape Town to improve and strengthen their participatory processes.

Urban households are almost completely dependent on government water services; there are no real alternative sources of supply. Poor households are most dependent, as they cannot afford to buy bottled water, install a rainwater tank or sink a borehole. They have recourse to only two responses to social water scarcity: engaging with government around the policies and practices which affect them (on a spectrum from formal participation to protest), and taking conscious responsibility for how water is used in the household once it is received. Our research and direct experience has shown that people are disempowered in terms of both of these responses. There are significant obstacles to both participation and personal action; these obstacles exist as external structural challenges and as internal 'agency' challenges, and often as a combination or dynamic interplay of both external and internal factors. All of these obstacles are exacerbated by poverty.

Consider TA4 village, Mitchell's Plain, a government housing development where water management devices were installed in every household. People in this area say they were not consulted when the devices were installed – they were told to sign a piece of paper when they received them, and were given a pamphlet explaining how the devices work, but they did not give their informed consent prior to installation nor do they understand these devices. We met Johannes Pieterse when his water had been off for four days. He was unaware of a leak before the device switched off, but woke up on Sunday morning to find a huge puddle beneath the bathroom sink, and his water off. He tried to phone three

different numbers, each time talking to a different person who did not speak his language. He was told that someone would come to fix the problem, but no-one had come. Each time he phoned, he had to buy a R5 talktime voucher, which ran out before he could get a firm answer from anyone. A toll-free number exists for landlines – and no-one in this area has a landline. You can sms a number, but they reply asking for your address and in new housing developments, people do not yet have formal addresses. Mr Pieterse had a sense that the water being cut off was related to a leak, but he had not tried to find or fix the leak, because he did not have the right tools and said he did not know how to fix leaks. He had not called a plumber because that would be too expensive. His only perceivable option was to ask for assistance from the municipality. Eventually, the EMG researcher phoned a higher ranking official in the water demand management department. The researcher had information about the way the devices are supposed to work, confidence in her right to complain, access to the contact details of decision makers above the level of call centre staff, and no limit to how long she could spend on the phone. She was able to communicate the problem and get a committed response. Only then was Mr. Pieterse's water reconnected.

Mr. Pieterse's experience is not an isolated example. His story highlights many of the findings of our research and direct experience:

1. Inadequate participation: Despite the rhetoric, participation in decision making around water services is extremely weak. At best, it is a one-way communication process through which people are asked to agree to things that have already been decided upon; at worst, it simply does not happen.

2. Inadequate response and reporting systems: The systems in place for reporting and responding to problems do not take people's lived realities into consideration. Many people are not aware of the correct procedures for reporting technical problems. Telephone calls costs money, and often are either not answered, or the person on the line is ill-equipped to answer questions in a constructive way, particularly if you, the caller, do not know how to ask the right questions.

3. Lack of knowledge, experience and confidence: Knowing how to ask the right questions requires knowledge, experience and confidence. Many people have piped water inside their homes for the first time when they move into an 'RDP' house. There is often a very murky understanding of

where the water comes from, how it gets there, whose responsibility maintenance is, or how to care for it. This is very disempowering; it severely hampers people's ability to improve their situations. A lack of understanding also fuels distrust of the state. For example, there is a widespread distrust of water bills and many people throw their bills away without opening them, or after reading only the bottom line. Suspicion and avoidance stems from not understanding free basic water, how tariffs work, why there is a cost attached to water at all, and high arrears. In workshops facilitated by EMG where municipal bills were methodically unpacked and explained, people were surprised to see that they did in fact receive free basic water, and that the amount of money they owed for water each month was normally quite low. This led to useful discussions about the link between leaks and high bills and therefore the importance of fixing leaks, and about ways to deal with the accumulation of debt.

4. Information alone is not enough: In 2004/5 'The Water Leaks Project', taught twelve community activists about their water rights and responsibilities as well as basic plumbing skills. Five years later, only one trainee had used these skills in his area and his own home. The reasons for this include lack of confidence in the new skills, expectation of a job, being overwhelmed by requests for help and not being able to respond. The trainee who voluntarily fixed leaks said that he'd already had a passion for water and plumbing.

5. Government Denial: There are massive structural obstacles to dialogue and participation, at every level – from incompetent call centre staff to defensive senior officials hiding behind 'protocol' to avoid engaging with community concerns. It is thus very difficult to communicate the nature of water problems to decision makers and politicians. In Cape Town, where we eventually managed to speak government officials, we were met with denial of problems and rhetoric as to why they didn't exist. This leaves little space for improving service provision or learning and building of trust between civil society and government.

These findings are of deep concern in the light of climate change. They point to a lack of resilience in an already stressed system, and to the urgent need for building resilience in order to adapt to further stresses.

7. Building resilience

The inevitability of climate change combined with the impoverished state of the water sector means that it is critical and urgent to start building resilience now. Building resilience is a decentralised adaptive response to climate change which develops as realities unfold, rather than a centralised rigid plan of what needs to happen. The state cannot be relied on to develop strategies that respond adequately to climate change in a way that enables people to emerge from poverty. Yet neither do communities have the power and resources to act autonomously from the state to ensure their own well-being. A combination of structural changes in the economy and institutions of state is required in addition to changes at a personal and community or local level.

Take water-pricing for example. Currently a limited amount of domestic water is subsidised and provided free or at below-cost price, primarily to low income households. The rest is allocated through the market – people decide how much to buy based on their needs and the price. Surplus is used to cross-subsidise low-consumption users. As water becomes scarcer, options for covering the costs of provision change, and questions of fair allocation become more pronounced. During times of drought water restrictions have been put in place to limit everyone's use (not just use by poor people). As climate change unfolds these events could become more frequent and financial planning needs to reflect this. Water allocated by rationing is a fairer and potentially more efficient response, but the cost-recovery pricing model will be totally inappropriate. This goes to the heart of structural changes that need to happen in economic planning and regulation.

A lot of the rhetoric about water conservation centres around the notion of 'responsibility' – we hear from government that poor people need to learn to take responsibility for their water consumption; water activists insist that it is the municipality's responsibility to fix leaks, etc. If we look at the word 'responsibility' differently, however, and we think about it as 'response ability' (Sacks, 2004), we see that there are many ways in which peoples' ability to respond are compromised. Building resilience in this context means building the ability of institutions and individual to respond. This requires openness to seeing in new ways, openness to learning, reflecting and adjusting, and a commitment to building relationships based on trust and dialogue between citizens and state.

At a municipal level, resilience can be built into budgets and plans so that:

- Tariffs reflect water demand management and rich-to-poor cross subsidy
- Water demand management interventions are pro-poor and not debt-recovery in disguise

- Investments respond to the urgency of climate change, i.e. are energy efficient, use renewable energy, resistant to storms, sea surges, sea-level rise, etc.
- Sufficient money is spent on maintenance of infrastructure, and there is contingency for damage from extreme weather events
- Both capital and operating expenditure is allocated to those areas within a city where services are currently non-existent or sub-standard
- There is meaningful dialogue between residents and local government; and public participation in water services policy and implementation processes.

At present, the institutions that manage our water are rigid, inaccessible and slow to respond to changes. There is little communication or coherence between departments. They attempt to operate as independent insulated systems, and maintain a distance or disconnection between themselves and the people and environments 'out there'. This is evident in the almost insurmountable institutional obstacles to participation which we have pointed out, as well as in the lack of serious planning for climate change.

There is a dire need for improved capacity in the water sector. One of the reasons water institutions are so rigid and slow is that there are not enough skilled people available to run things smoothly. In most municipalities there is neither sufficient capacity to implement nor to regulate; and this inability to regulate exists at the national level too. There is a severe shortage of engineers and skilled maintenance staff – this means that even the most fundamental functions of water services are at risk of neglect. There is therefore no adaptive capacity to respond to dynamic circumstances. This is a structural problem and requires skills development at all levels – maths and science in schools, engineering at university, and on-the-job training and support. It requires political will followed by dedicated budgets.

Capacity development cannot only focus on technical skills, however. The water sector has a huge amount to learn about meaningful participation, and this critical aspect of water services cannot merely be tacked onto the job descriptions of engineers and hydrologists. Nor can participation continue to be outsourced to private consultants. There is a need for qualified and full-time community facilitators within municipalities, and a commitment to real participation in all spheres of water decision making, with dedicated budgets. Participation needs to be viewed as a cornerstone of sustainability, and it requires nuanced approaches, including multi-stakeholder dialogue (Galvin, 2009).

One starting point for improving participation and relationships between citizens and government is better systems for responding to technical faults at a household level. There is a need to shift the onus being on (poor) households to solve technical failures such as broken water management devices, to the state taking responsibility for faulty systems they provide. This requires toll-free lines that work, operators who are polite, patient and well equipped to help solve problems, and an understanding of the needs and challenges of poor citizens. If people know there is help at the end of a phone line, it will build trust and confidence.

These systemic changes would, in theory, improve people's abilities to respond to their water challenges. But there is also a need for personal changes within individuals, so that people would be able to take advantage of this improved system, or able to take action on their own. The ability to make good decisions is a critical aspect of resilience and adaptive capacity. Being able to make good decisions requires knowledge about the prevailing environmental, political and economic systems, as well as about one's rights within those systems. Linked to this is confidence; knowing what questions to ask, knowing what your rights are, and knowing that there are things you can do yourself, means that you are more willing and able to take action. Realism is also a critical quality to develop – realistic expectations, backed up by knowledge and confidence, offers an empowering alternative to rhetoric or denialism, both of which are rife amongst both citizens and government officials. Finally, trust is essential for resilience building. There has to be hope and a belief that your voice will be heard, and that taking action to improve your situation will get you somewhere.

The nurturing and building of these attributes are possible through a combination of education and action; a combination of local organising, personal responsibility and strategic engagement with the state. Relationships between households within a community, between different communities, and between communities and civil society at large, are very important in terms of the support and solidarity that are necessary for learning and adapting.

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