



Summary: Workshop on Water Equity and Resilience in Southern Africa

August 24-26, 2016

The Stellenbosch Institute for Advanced Study, Stellenbosch, South Africa

Workshop Description

The International WaTERS Network (www.international-waters.org), with support of the Peter Wall Institute of Advanced Studies (<http://pwias.ubc.ca/>), the NEPAD Centers for Excellence (<http://www.nepad.org/programme/nepad-water-centres-excellence>), the Water Research Commission of South Africa, and other partners (see end of report for full list) were proud to host an international workshop on equity and water-related resilience in southern Africa. We successfully collaborated and shared insights from researchers and practitioners focusing on, and based in, southern Africa. Additionally, this workshop focused on goal setting, research dissemination and grant writing for the future of the International WaTERS Network research program.

Thematically, the workshop critically interrogated notions of resilience, highlighted definitions and framings from different disciplinary traditions, and integrated insights from scholars and practitioners with focus on southern Africa. Considerable attention during the first two days was given to case study work in the region.. The third day was made up of small group and plenary discussions of collaborative publications and grant applications to extend this work, looking ahead to future needs and collaborative possibilities.

Please see our website for the detailed workshop agenda, as well as a full participant list and contact information: <http://www.waterequity.pwias.ubc.ca/>

These details are also provided in the annexes of this report.

This workshop summary was prepared and edited by: Emma Luker, Lucy Rodina and Leila Harris from the Institute for Resources, Environment and Sustainability, The University of British Columbia, with contributions from J. Goldin, of the University of Western Cape.

Day 1 of Workshop

(August 24, 2016)

Key Themes of the Day

The first day of the workshop was centered around key themes and concepts regarding vulnerability and resilience; governance, nexus thinking and the origins of resilience; and design considerations for resilient systems.

Gender Sensitive Adaptation Strategies for Climate Change: Presentation and Discussion, *Water Resources Commission Reference Group Meeting*

The morning began with a presentation by J. Goldin (University of the Western Cape) on vulnerability assessments including gender impacts and emotions as linked to climate change. She presented on this theme along with Cobus Botha, from the Agricultural Research Council, who spoke about the various adaptation and mitigation strategies that have been identified to cope with the impact of changing rainfall patterns due to climate change, on crop production in Lambani. The overall project aim is to design a vulnerability framework that is gender sensitive and in so doing, considers the extent to which regional policy frameworks address the main impacts of climate change felt in Lambani, South Africa. Using a Capability Approach (adapted from Amartya Sen) in order to bring new insights, this project focuses on perceptions people carry in their hearts and minds as well as material livelihood changes, such as feelings of disgust, anger, and fear, and the way that climate change provokes these feelings.

Goldin further noted the important issues of scale, temporality, disaggregating data and considering different segments of the population and their diverse and specific experiences within a vulnerability assessment framework. The presentation concluded by reminding participants that studies on climate change have not always considered women and emphasized how important it is to use a gender lens when designing a vulnerability assessment framework.

This presentation was followed by a group discussion regarding the ways that gender interacts with changing climate impacts, the desired audiences for vulnerability assessments, and the general themes of power, agency and traditional politics.

Key Approaches to Vulnerability and Resilience Studies: Panel

A panel (made up of: L. Harris, A. van Rooyen, M. Musemwa, M. Galvin, W. Mulwafu) then discussed the key concepts that might be included in a vulnerability and resilience framework. Panel members discussed the idea of revisiting some of the elements of the proposed vulnerability assessment. Possibilities noted: regional social histories and context; a nuanced definition of gender and gender roles; inclusion of additional stakeholders such as communities with deep local ecological knowledge; and more complex understandings of community dynamics, such as economic and political changes over time. The full report provided to the WRC is available from J. Goldin on request.

Session II.

The Importance of a Water-Energy-Food Nexus Perspective for Enhancing Resilience of Water Governance and Management: C. Pahl-Wostl

C. Pahl-Wostl started off the individual presentations using the water-food-energy nexus as an approach to challenge silo-ed thinking in the context of fragmented water governance. This nexus thinking approach was used in an example using multi-level governance frameworks directed at solving the problem of groundwater pollution due to high livestock densities in Germany. Nexus thinking was ultimately linked to the Sustainability Development Goals, and how polycentric governance could be an opportunity for larger transformative change towards sustainable cities and communities. We have provided several links to resources on polycentric governance on the workshop website, and for participants, PDFS in the dropbox.

Tracing and Situating Water Resilience: L. Rodina

Lucy Rodina presented elements of her doctoral work on water resilience. Resilience is now a dominant concept shaping policy and research on water governance. This talk outlined how the concept of resilience has been applied in various domains of water governance – including dealing with drought, floods, water quality risks and urban water management. Among the main themes for understanding water resilience challenges are: integration across water sectors in response to multiple and dynamic risks (breaking silos), emphasizing the links between drought, flood and other water-related risks, harnessing nature as a buffer to risks and hazards (“re-greening of urban waterscapes”), and rethinking governance in terms of scale and actors. This presentation served to help anchor definitions of resilience that were used throughout the rest of the workshop.

Developing a Theory of Urban Drought Resilience: L. Baker

Baker discussed drought as a social-ecological phenomenon as ecosystems are not separate from people and cities. The talk outlined the differences between resilience versus robustness and proposed metrics for drought resilience including water availability, and GINI coefficient to incorporate equity in water access, among others. One of the recommendations focused on connecting communities with data and predicting drought based on antecedent conditions to help thinking through building urban resilience to drought. The presentation sought to propose several starting points for a research agenda on urban socio-hydrologic drought resilience, including several potential indicators and possible hypotheses to test and evaluate. He also discussed technology for increasing transparency and equity, and data processing capacity as key considerations for future research.

Building resilience to climate change through the adoption of Water Sensitive Design principles: K. Carden

Water Sensitive Urban Design (WSUD) focuses on a paradigm shift, and the need for thinking about all forms of water along the water cycle as a *resource*. WSUD frameworks are being applied the city scale in Cape Town. The talk identified the need to reduce water leakages and losses before new sources of water supply are to be introduced. It also highlighted the uptake of green infrastructure, stormwater harvesting, treating water close to the source and for-for-purpose water uses as resilience building strategies. The talk

also highlighted the links between flood and drought resilience through multi-functional water infrastructure.

Water supply diversification in Cape Town: Opportunities and challenges in groundwater governance: E. Luker

In Cape Town water demand is increasing, while high variability in rainfall is also putting higher stress on surface water supply. This means that there are new schemes being planned for new water supply sources, which are increasingly likely to involve groundwater. More institutional support is necessary in order to better understand where groundwater management responsibilities might move, particularly at the city scale. In terms of water source diversification, new water sources will provide higher infrastructure flexibility in times of drought and may build higher resilience into Cape Town's urban water supply system.

Day 1: Concluding Remarks

The first day highlighted a range of connections relevant for water equity and resilience, both in theoretical and applied senses. Case studies and ongoing research projects were used in conjunction with in-depth analyses of resilience frameworks to inspire discussions about what future International WaTERS research agendas and particularly opportunities for enhanced collaboration in southern Africa.

Day 2 of Workshop

(August 25, 2016)

The second day of the Water Equity and Resilience Workshop covered several case studies across southern Africa, and were concerned with the broad themes of: resilience and social-ecological wellbeing at the catchment level; water management and politics in urban, peri-urban and rural settings; and governance and transformative change. Day 2 also included a discussion with a member of the Environmental Resource Management Department at the City of Cape Town (H. Davies) and a Researcher from the Parliamentary Committee on Water and Sanitation at the Parliament of the Republic of South Africa (T. Manungufala).

Resilience at the city and neighbourhood scale: Durban's 100 Resilient Cities Programme and the Palmiet River Rehabilitation Project: C. Sutherland

This presentation focused on the process of coming up with the Resilience strategy for the eThekweni Municipality in Durban, and included attention to the importance of social learning. As a case study, the Palmiet River rehabilitation project was discussed. eThekweni is a member of Rockefeller's 100 Resilient Cities program, and stands out for defining locally-derived understanding of resilience. Using this example, Cathy showed how resilience does not always translate into a desirable state, and highlighted the need to think about resilience for whom, how and why? The presentation and discussion also emphasized 'bold' participatory governance.

Redesigning Water Access for a Better Future: W. de Clercq

Regarding the Breede River catchment in the Western Cape, Willem described water access in the agricultural sector as a complex system in transition. Among the challenges in the areas are farmer unrest, land reform, and need for electricity for irrigation. The talk

highlighted the following key themes: collective problem solving, willingness to participate, creation of job opportunities, and linking water and land reform. Moving forward, costs will be high to manage water constraints – what are the implications of this—building new dams? If so, who is going to pay? The talk sought to raise these important challenges, and the range of responses that might be possible or desirable going forward. The presentation also emphasized the importance of identifying – and knowing – where water comes from, and to be aware of the range of landscape issues and concerns that are linked with water.

Water as an Integrator for Health and Socio-ecological Well-being: The Baynespruit in KwaZulu-Natal: S. Stuart-Hill

Sabine sparked a discussion on social-ecological services from freshwater ecosystems in urban settings, and how these affect human health and wellbeing. Effects of climate change on quality of life and distribution of impacts were among the focal points of her talk. Other highlights were examples of how high vulnerability is not homogeneous across different scales, which has resulted in data gaps. As such, the talk offered focus on complex interaction between scales of wellbeing, possibilities of building resilience through focus on water quality, as well as other broader concerns of importance from a biophysical perspective.

Key Governmental Issues in Water Equity and Resilience: Questions & Answers

H. Davies (City of Cape Town, Environmental Resource Management Department) and T. Manungufula (Parliament of RSA, Researcher for the Water and Sanitation Portfolio Committee) engaged in a group Q&A on the major workshop themes. Key topics addressed were: transboundary knowledge sharing and collaboration; systemic change in South Africa; responsibilities of a resilient system or subsystem; research gaps; citizen agency and empowerment; and the research-policy interface. Specific points of discussion also focused on the potential, or utility of creating hubs and interfaces to improve communication between researchers and practitioners, among other concerns.

Gender, Tenorial Niches in the Kandeu Informal Irrigation Scheme of Malawi and their Implications for Drought Mitigation: E. Mapedza

Everisto Mapedza argued in his presentation that a better understanding of gender is needed when studying drought mitigation strategies. Drought is a multifaceted issue, which is often dehumanized and de-gendered. Instead, it was argued that drought vulnerability is highly gendered and there is a need for sex-disaggregated drought data to represent different coping mechanisms and impacts in vulnerability assessments. It was proposed to move away from the male-female gender binary as gender is considerably more nuanced than this. (*This presentation recalled several of the themes raised in the opening discussion on gender sensitive assessment*).

Illegal Actors & Networks: Invisible (Peri-)urban Investments in Water-Intensive Production and Consumption: A. Bolding

Alex presented evidence for what we can learn from agrarian intensification in rural areas and what this might mean for urban spaces, or “urbanscapes.” Some urban areas are booming, while others are stagnant. He discussed the ontological dimensions of water

access and the built environment. Who gets to define what a slum is? Who has the right to define what sanitation is? The presentation ended by highlighting the need to allow for more decentralised user control, and move towards horizontal forms of organization in urban water systems.

A Political Ecology Analysis of Water User Associations, and Water Service Provision for Women in Peri-Urban Areas in Blantyre, Malawi: A. Chiweza

Asiyati spoke about the potential for water user associations (WUAs) in facilitating women's right to domestic water supply and greater public participation. Her focus was on affordability and procedural equity in Blantyre, Malawi. She suggested that there is limited information being disseminated by the WUAs to local women. This is noteworthy because WUAs have the potential to facilitate access to water through more public kiosks, and more information on relevant water issues, including erratic water flows and increasing costs. Implications for participatory governance and gender equity were discussed, as well as the voices that government encourages to participate.

The Politics of Water Reuse in Maputo City, Mozambique: A. Biza

Adriano Biza gave a talk on the water shortages currently being felt in Southern Mozambique. The situation was described as dams being under capacity and the city having a fragmented governance system between water and sanitation. The majority of people live in informal settlements, while the sewage system comes from colonial period (and so has attendant gaps that flow from those legacies). Unequal distribution of WASH services is a key component of urban inequalities at present. This talk ended on the question of how water reuse reform and corresponding infrastructure will affect the people living in informal settlements. Political implications on water distribution, equity and sustainability were also discussed.

Transformative Capacity: Towards Inclusive, Thriving, and Regenerative Urban Settlements: G. Ziervogel

Gina presented about a project with the Berg River municipality that has been designing a climate change adaptation strategy (see flowafrica.org) while employing transdisciplinary research and focusing on "thrivability" (Russel, 2013). The FLOW project focuses on engaging youth, business and government to co-build capacity for adaptation to climate change impacts. This includes mapping out informal business activities and reconnecting to natural systems in order to promote self-awareness and become active co-creators of one's own futures. This work focuses more explicitly on transformation of individuals, as well as society as a whole. Among the key themes of the project were: agency, independence, creativity, social cohesion and building stronger connections to others. The presentation covered both the process, and key outcomes of the effort.

Making Community Based Adaptation a Reality: Different Conceptualizations, Different Politics: M. Galvin

This talk presented a critique of adaptation as a political, ahistorical, and technical undertaking. Transformation and resilience do not always sit well together. Another key message from this talk was that climate change is affecting water access which is in turn affecting water service delivery, and this is causing protests and civil unrest in South

Africa. Mary focused on unpacking the meaning behind “community-based adaptation,” as different people mean different things by the term. A key question posed was: how do the goals, objectives and intentions of climate change work, differ from development work? In terms of project design, it is important to try to embed work with focus on tangible change, so that people recognize the actual, applied change and how it is relevant outside of academia? The talk ended with the identification of an important goal: create openings for community engagement and focus on how information is communicated and shared.

Brokering Positive Change in Complex Systems: Can Innovation Platforms Facilitate More Resilient Systems? A. van Rooyen

Andre ended the individual presentations with a talk about innovation platforms as a way for visioning people’s lives now and in their future, with attention to the question: where do we want to go and how can we get from now to the desired future? This method of present and future state analysis was suggested as a space for envisioning resilient, but also sustainable systems, that enable people to ask the right questions and create an open dialogue with stakeholders. Network analysis can also be helpful as it questions which actors are connected to whom and shows where we could strengthen connections. Andre concluded his presentation by noting through this visioning process there could be more than one desirable future and that individuals need to make their own decisions as to where they want to be in the future.

Day 2: Concluding Remarks

The second day of the workshop wrapped up with identification of some key themes and identification of several new questions for consideration. The range of presentations and discussions over the course of the day highlighted the importance of multidisciplinary methods, and firmly concluded that equity remains important for discussions and programs of adaptation and resilience, given considerable variabilities of water access and conditions. Further, it was suggested that it may not be appropriate to critique resilience for not having a single, concrete definition, because few integrative concepts do. What is essential then, is to ask: what are these concepts allowing us to talk about or do? What are limitations and the benefits of these concepts? And finally, how can we strategically use the concepts of equity and resilience to contribute to transformative water governance in southern Africa?

Day 3 of Workshop (August 26th, 2016)

The final day of the workshop was devoted to pitches for papers, research projects and insights building on the workshop discussions. We also had a guided discussion on comparative research design led by C. Pahl-Wostl, and a visioning session on future research agendas led by A. Van Rooyen. Throughout the day we planned and brainstormed on future collaborative projects. Our key goals identified at the end:

1. A short thought piece synthesizing the workshop themes (equity and resilience) and recommendations for future research (~5000)
2. A special journal issue with multiple papers to which participants would collaborate and contribute

3. An article centered around comparative research; and finally
4. Research design for comparative research (including possible publication)

Our goals, plans, and timelines for each of output is summarized below.

Key Workshop Outputs

1. Overarching Conceptual Piece: Led by L. Rodina

The first deliverable identified for this workshop is a **short framing thought** piece (~5000 words) on equity in relation to resilience and water governance in SADC (and more broadly). This will be led by L. Rodina, and likely co-authored by workshop participants who expressed interest: G. Ziervogel, J. Goldin, L. Baker, L. Harris, M. Galvin, G. Owen, E. Mapedza, W. Mulwafu, D. Scott and A. van Rooyen.

Some examples of similar thought pieces of this type include: Friend et al. 2016 and Pahl-Wostl et al. 2013 (see full references below, these pieces have also been posted in the workshop folder in Dropbox). The goal of this paper is to frame the contributions and key themes raised in the workshop. The broad theme is ‘rethinking resilience from an equity perspective.’

Timeline: First draft to be sent out by Lucy Rodina by **October 25**. Input will be requested over the period of 3-4 weeks. The goal is to try to finalize the paper by Dec 1.

Possible journals: Current Opinion in Environmental Sustainability, Sustainability, Resilience, Water.

2. Special Journal Issue: Led by J. Goldin, S. Stuart-Hill, G. Owen (eds)

A special issue of a journal was decided upon as the second workshop deliverable, with different teams of participants showing interest in different collaborative articles spanning a range of topics surrounding the core themes of the workshop. The editorial roles for this issue were delegated to: J. Goldin, S. Stuart-Hill, G. Owen. This team committed to communicate with the broader workshop team soon with a timeline and overview of expectations for the special issue moving forward. Potential papers for inclusion in the special issue include:

1. Critical genealogy of resilience, with focus on water and resilience
 - o Leads: L. Rodina and A. Bolding (already in progress. Will be sent out for feedback by late October)
2. Soliciting insights from case studies on what enables transformative change
 - o Lead: A. Chiweza
3. Resilience, equity and historical change in Southern Africa/ Historiography of equity and change
 - o Leads: B. Ngwenya, M. Musemwa, W. Mulwafu
4. Transformational change and adaptation: Politics of climate change and adaptation in Southern Africa
 - o Comparison between countries, hegemonic concepts re adaptation
 - o Lead: M. Galvin

5. Vulnerability assessment framework and scale
 - J. Goldin
6. Biophysical metrics on resilience, integrated research program (paper project)
 - Lead: L. Baker

Critical next steps: the editorial team for the special journal issue is to develop a timeline for the drafts and submissions to the editors, and the journal. Possible journals: Water SA, Water International, Wires Water, Transformation, South African Geog Journal.

3. Comparative Research Paper: Led by C. Pahl-Wostl

The third deliverable will be an article centered around comparative research, and will be spearheaded by C. Pahl-Wostl, and supported by C. Sutherland, S. Stuart-Hill, L. Harris, and M. Galvin. The aim is to develop a paper that considers important elements for comparative research design related to the workshop themes. In particular, research might involve focus on state-society relations, questions or survey instruments, inventory of cases, research template, major questions that can be investigated comparatively, etc... The team will begin with a skype call in the coming month to discuss plans and expectations. Key Next Step: C. Pahl-Wostl to coordinate initial skype call.

4. Paper on design for comparative research on urban resilience (socio-hydrological focus): Lead: L. Baker

The final outcome of the workshop was identified to be a designing a research agenda for comparative research, with the possibility of writing this up as a paper (there is some overlap with item 3 above, to be clarified by the leads soon). This focus will cover the main themes of: equity-resilience; multi-sited case study approach; biophysical metrics; socio-technical and green design; Global North vs South; and engaged research and action research. These core ideas were discussed at length over the duration of the workshop and suggested to encapsulate some of the main practices behind engaging academic research more effectively with policy, specifically at the nexus between researchers, policy makers and funding communities. With a publication of this type, this will help to establish a future research agenda and needed follow up work. Key Next Step: L. Bakker to write a 1-2 pager on the goal for the paper and effort, and solicit input.

Network Funding and Student Funding

Finally, three major goals were identified related to the International WaTERS Network. These goals are relevant both for the Network, as well as students who are aiming to be involved with or funded by, the Network. We also are soliciting ideas, collaborators, and lead investigators for funding proposals to keep the Network going and initiative follow on stages for the project. In moving towards this goal, please keep in mind these key goals:

1. To establish a the global network for research and learning on water governance (focus on equity, integrative and collaborative research, etc..)
 - a. Key goal of the Network, is to foster collaboration and sharing
2. Expose students to a broader network of scholars, and provide training
 - a. From multiple backgrounds, disciplines and research interests

- b. To date, funding for graduate students as been an important component, as has the development of training modules, etc.
 3. There is currently the possibility of submitting new proposals for funding to extend the work of the Network. Please let us know if you might be interested.
 - a. To support this possibility, it is possible to apply directly to the Network for seed money. To do so, please send a 2 page application to L Harris, who will share it with the steering committee

The Network welcomes any future efforts, or proposals, that fit in the spirit and goals of International WaTERS. For more information see www.international-waters.org or please feel free to contact L. Harris to discuss.

Concluding notes and to-do list

Overall, together we covered a broad range of topics and promoted a spirit of collaboration amongst the participants. The resilience concept was thoroughly critiqued from an equity perspective, but also acknowledged as a boundary concept with multiple definitions and multiple ways of engaging, depending on goals and lenses we might apply (including equity). The deliverables of the workshop will seek to further distill and communicate this important interface for other communities of scholars and practitioners. Future work may also seek to emphasize the relationship between water resilience and: quantitative indicators, the Sustainable Development Goals, institutional and academic spaces, Policy-Research exchanges and linkages, or further consideration of scale and social justice. Participants mentioned other specific gaps in work being done on water, equity and resilience in southern Africa, as well as with respect to best research practices, notably working towards engaged scholarship and the co-production of knowledge.

Acknowledgement of Sponsors and Partners



Annex I

Workshop Agenda and Abstracts

I. Towards Gender Sensitive Adaptation Strategies for Climate Change

10.15–11.15 Dr. Jacqueline Goldin, University of the Western Cape, and **Cobus Botha**, Agriculture Research Council

Towards Gender Sensitive Strategies for Responding to Challenges Posed by Climate-related impacts

The first morning will be spent detailing the outcomes of a recent research project focused on adaptive strategies of women in Lambani, Limpopo Province. This will draw on the Capability Approach to highlight differentiated aspects of resilience and vulnerability of men and women to climate variations and stress, such as: extreme heat, cold, droughts or floods.

Those who live in remote rural settings remain largely absent from climate change related decision-making processes. This is especially true for women who are nonetheless affected, and arguably, often more so than other groups. While policy makers, researchers, development practitioners and planners often claim to represent the voices of the poor, too often they engage technical language that is inaccessible to those communities who are most vulnerable to ongoing changes. Importantly, the linkages between environmental degradation (due to climate change) and human security require analysis of concrete examples to better understand the pathways and effects of vulnerability and resilience. Women's experiences and voices are key to such an enriched understanding. For this reason, deliverable 3 of K5/2314 has captured the narratives and voices of relatively impoverished rural women in Lambani, Limpopo Province, and in so doing seeks to bring the wisdom, experience and concerns of women facing the effects of climate change to the fore. There are several possible climate change outcomes that are likely to be of particular concern for rural populations in heavily agricultural regions such as the one that is the focus of our study. Focused on the issues of concern and identified by the by residents (villagers/farmers) of Lambani themselves, three particular dimensions and effects of climate change are emphasized 1) occurrence of floods and droughts 2) changing hydrologic regimes and 3) intensified hot or cold periods.

The goal of this session is to disseminate knowledge gained through the project and to seek expert input from participants to inform the construction of a vulnerability/resilience framework. The aim is also to introduce key concepts and ideas to be taken forward for the remainder of the workshop.

11.15–12.30 Panel discussion: Key concepts and approaches for Vulnerability and Resilience Studies (**L. Harris, A. van Rooyen, M. Musemwa, M. Galvin, W. Mulwafu**)

12.30-1.30 Lunch at STIAS

II. Approaching Resilience: Governance Perspectives

1.30-1.45 **Dr. Claudia Pahl-Wostl**, Institute for Environmental Systems Research (USF), Germany

The Importance of a Water-Energy-Food Nexus Perspective for Enhancing Resilience of Water Governance and Management

Water governance and management face serious and increasing challenges in times of global change. Water security for people, for economic activities and for ecosystems cannot be achieved from within the water sector. Water related services are essential for and are influenced by numerous activities in other domains, in particular agriculture and energy production. Such strong interdependencies have led to the claim that a water-energy-food nexus perspective has to be adopted in governance and management. Assuring the security of water, energy and food without jeopardizing the environment is an essential condition for sustainable development. The presentation will discuss requirements for governance and management and for transformative change associated with adopting and implementing a WEF nexus approach. It will elaborate on the specific challenges arising in the urban context, in particular in fast growing, dynamic urban agglomerations of the Global South.

1.45-2.00 **Lucy Rodina**, PhD Candidate, IRES, University of British Columbia, Canada

Tracing and Situating Water Resilience

In the coming decades, countries throughout the world will face increasing challenges due to climate change and changing hydrologic conditions. These challenges will be particularly acute in the Global South as they interact with existing pressures on already stressed water resources, such as increasing demand for water due to population and economic growth, poverty and inequality, and lack of institutional capacity, among others. This talk will provide an overview of key themes from resilience thinking as they apply to urban water governance, with specific attention to droughts, floods and associated water-related risks. This research investigates the use of resilience thinking in the context of urban water governance broadly, both conceptually and in practice. With a specific focus on a case study from South Africa, the talk will elaborate on the importance of a *situated understanding of water resilience* - attentive to specific biophysical environments, lived experiences, socio-political and governance contexts, power and marginalization. Through this approach, the study will also further inform the possibilities for addressing equity and social justice concerns within a resilience framework.

2.00-2.40 **Discussion: *What are key considerations for/indicators of resilience from a governance perspective? How do we plan for, and manage, for resilience?***

2.40-3.00 **Coffee/Tea Break**

III. Designing and Implementing Resilient Systems

3.00-3.15 **Dr. Larry Baker**, Ecological Engineering Group, University of Minnesota, USA

Developing a Theory of Urban Drought Resilience

Global changes are increasing the threat of devastating urban drought. Specifically, these drivers are global climate change, growing urban populations, and increasing per capita water demand. Surprisingly, very little research has been conducted to understand urban drought. Building on several previous workshops and projects this talk elaborates an approach to ecosystem resilience applied to urban systems. Briefly, four hypotheses are: drought resilience depends upon (1) antecedent conditions; (2) appropriate scaling of governance in time and space; and (3) capacity to generate desirable feedbacks; and (4) capacity to adapt. Developing and testing a theory of urban drought resilience would require a transdisciplinary approach – a challenge for a broad interdisciplinary community of researchers.

3.15-3.30 **Dr. Kirsty Carden**, Department of Civil Engineering, University of Cape Town

Building Resilience to Climate Change through the Adoption of Water Sensitive Design Principles

This talk will consider water as a resource, and a series of water and wastewater related considerations to build resilience to climate change. This presentation will include focus on Water Sensitive Urban Design and Sustainable Drainage Systems, as well as the identification of alternative water sources (e.g. stormwater, greywater, treated wastewater etc.) for fit-for-purpose uses to off-set potable water demand in urban areas.

3.30-3.40 **Emma Luker**, Masters' of Science student, IRES, University of British Columbia.

Water Supply Diversification in Cape Town: Opportunities and Challenges in Groundwater Governance

Water managers in Cape Town indicate that the record low rainfall of 2015 has caused the worst drought they have seen in 30 years. This recent drought is expediting the need for additional water demand and supply management mechanisms, one of which is the diversification of water supply sources. However, given regional water managers' historical focus on surface water infrastructure and planning, there are significant obstacles in adding new sources, such as aquifers, into the supply chain. This talk will be aimed at presenting the preliminary findings of an analysis of the barriers and opportunities for groundwater governance in Cape Town from a long-term planning perspective. Insights will analyze the groundwater landscape from an interlinked institutional and hydrological perspective in relation to the broader conversations surrounding water supply diversification and urban water resilience.

3.40-4.20 **Discussion: *What are key considerations for/indicators of resilience from a systems/design perspective? How do we plan for, and implement resilient systems?***

4.20-5.30 **Entire group introduction (2 minutes maximum per participant)**

5.30-6.30 **Optional walk in Jan Marais reserve before dinner**

6:30 pm **Welcome Reception/ Braai at STIAS**

THURSDAY, AUGUST 25 2016

IV. Adaptation and Resilience in Cape Town & Durban: Lessons & Insights

9.00- 9.15 **Catherine Sutherland**, PhD Candidate, Geography and Environmental Science, University of KwaZulu-Natal

Resilience at the City and Neighbourhood Scale: Durban's 100 Resilient Cities Programme and the Palmiet River Rehabilitation Project

This paper reflects on the relationship between Durban's 100 Resilient Cities (100RC) Programme at the city scale and the Palmiet Rehabilitation Project, which focuses on collaborative water and climate governance for resilience at the local scale. Durban's 100RC programme, funded by the Rockefeller Foundation has included extensive stakeholder engagement, the identification of dominant discourses shaping multiple actors conceptions of resilience, the identification of critical issues and resilience themes, and a systems analysis to uncover underlying systemic challenges across the main themes. At a local scale the Palmiet Rehabilitation Project is developing an innovative and experimental governance model, including a wide range of actors (the municipality, the university, community based organizations, businesses and communities) to address issues of water security, climate adaptation and resilience. Governance processes for resilience are therefore happening at different scales and within different spaces in the city. It is therefore important to explore the relations between these different processes, examining whether: there are common actors and discourses between the two processes; whether they shape or influence each other; and whether the social learning taking place in both governance arenas could be shared, leading to greater integration, knowledge building, connectivity and adaptive systems building.

9.15-9.30 **Dr. Willem de Clercq**, Water Institute, Stellenbosch University

Redesigning Water Access for a Better Future

This talk will introduce the flagship program "complex systems in transition," focusing on the water / energy problem that faces the Western Cape (as well as other contexts). The Western Cape faces a number of challenges, including population growth, increased consumption of energy, and decreasing water availability per capita. Global change is adding further complexity to the problem, as it impacts on planning and the availability of resources. The government of South Africa recognizes agriculture as the largest employer and provider of food to many. When it comes to providing land to the poor, the government has plans to do so, but water serviced land does not form part of this planning. This talk focuses on The Breede catchment, considering water supply and current uses of the river, as well as the potential for new water supply system changes which would be expected to have a number of benefits, from lower electricity usage, to reduced water consumption, and so forth. The talk suggests that failing to upgrade the system may pose problems including increased unrest in the region, lowering the quality of food produced, and increased cost of production, all of which would also have important implications for a major revenue source in the Western Cape.

9.30-9.45 **Dr. Sabine Stuart-Hill**, Centre for Water Resources Research, University of KwaZulu-Natal

Water as an Integrator for Health and Socio-ecological Well-being: The Baynespruit in KZN

One of the most well-known tributaries of the uMngeni is the Baynespruit, it is re-known for being one of the worst polluted rivers in SA. Drawing on this example, this talk speaks on a general and national level to issues of current and emerging vulnerabilities under climate change. The relation of those vulnerabilities to social-ecological well-being including some reflections on resilience. The case of the Baynespruit then focuses on formal and informal settlements and urban farming within that context. Given the focus on health, as well as the broader context of climate change, water quality is a particularly salient issue for consideration here. Overall the talks emphasizes the importance of water as it integrates issues of sustainability, vulnerability, health and well-being not only on an individual but community and national economic scale.

9.45-10.25 **Discussion: *What do these case studies tell us about adaptation and resilience in these contexts? What research questions and opportunities are suggested by these examples?***

10.25-10.40 **Coffee/ Tea Break**

10.40-11.00 **Discussion with City of Cape Town managers (H. Davies) and National government researchers (T. Manungufala)**

11- 12pm **Group Brainstorming and Discussion: *Key elements to Reframe and Situate Resilience with focus on Equity, Governance, and Socio-ecological well-being***

12-1pm **Lunch at STIAS**

V. Politics and Water Management: Peri-urban, Rural and Other southern African Examples

1.00-1.10 **Dr. Everisto Mapedza**, International Water Management Institute (IWMI)

Gender, Tenurial Niches in the Kandeu Informal Irrigation Scheme of Malawi and their Implications for Drought Mitigation

Irrigation is one of the key mechanisms for addressing rainfall variability and droughts. Formal cadastral boundaries are perceived as an incentive for individuals to invest in land (e.g. De Soto). This talk paper argues that the gender of the landowners and land users influences investment on land and irrigation. This study also looks at how gender and tenurial niches overlap as decisions on irrigated agriculture are undertaken within the context of fuzzy and shifting land tenure boundaries which have enabled investment in

agriculture in a gendered manner. Key features and tensions emerge that are of interest to consider for an appreciation of these shifting agricultural practices. Among them, the same piece of land is used by different users in the irrigation season, and the landowners will then have access to the land during the rainy season. Whilst a nominal rental fee is paid to the landowner, irrigators also at times destroy the irrigation bedding and build mounds which the land owner would normally use to plant crops in the rainy season. Such shifting tenurial arrangements have seen both the landowners and the irrigators investing in irrigation and use rights of land changing over seasons which is akin to what Fortmann terms tenurial niches which varies with seasons, but are well engrained within social practices. These practices will be evaluated with an eye towards the implications for resilience and adaptation in rural Malawi.

1.10-1.20 **Dr. Alex Bolding**, Water Resource Management Group, Wageningen University

Illegal Actors & Networks: Invisible (Peri-)urban Investments in Water-intensive Production and Consumption

Ever since the ‘realisation’ that over half of Africa’s population lives in peri-urban settings, the poverty alleviation agenda has shifted attention from traditional rural development settings to the conundrum of the (peri-)urban waterscape where poor, illegal slum dwellers try to make the best of their contested access to often polluted and scarce natural resources. This has led to intensified forms of urban agriculture driven by invisible (and often illegal) investments in waste water irrigation ventures and other water-networks creating access to drinking water and sanitation facilities that the officially responsible institutions cannot or refuse to provide. My interest lies in the robustness and persistence/durability of these water networks, whereby the latter are seen as socio-technical constructs comprising heterogeneous wholes. My paper will focus on novel conceptual approaches to study water network builders that operate in the peri-urban margins. The concept of ‘political society’ as developed by Chatterjee (2004) and applied in slums in South Asia, and Mumbai in particular by Galli (2013), and the work on informal actor-networks – built by people investing in their own alternative decentralised networks, going beyond the formalised system as evidenced in Chimoio, Mozambique by de Bruijne (2009), serve as illustrations for understanding the emergence and persistence of such watery ventures. Supporting evidence will be gleaned from Woodhouse’s (2002) paper on investment in low cost water technologies (e.g. treadle pumps) in areas with a labor surplus and close proximity to urban markets as well as the concept of hydraulic property creation as developed by Coward (1986). By way of conclusion an agenda of interesting avenues to study informal investments by the poor in water networks in urbanscapes will be highlighted.

1.20-1.30 **Dr. Asiyati Chiweza**, Department of Political & Administrative Studies, Univ of Malawi

A Political Ecology Analysis of Water User Associations, and Water Service Provision for Women in Peri-Urban Areas in Blantyre, Malawi

This paper focuses on the Political Ecology of Water User Associations (WUAs) as decentralized water governance institutions and their potential to promote sustainable

domestic water service provisioning for women living in peri-urban areas in Malawi. Drawing on empirical data collected over a 3-year period from Nkolokoti-Kachere WUA in Blantyre the presentation discusses the political and economic drivers that influenced the evolution of WUAs in peri urban water governance and how this influenced women's experiences of water provisioning. The evidence shows that initiatives to improve the sustainability of water supply through the WUA kiosk system have indeed increased the number of public kiosks and reduced the distance women used to travel to look for water, but this has not translated into water supply that is readily available and affordable for them. As a result, the women have prioritized use of the WUA kiosks to access water mainly for drinking and cooking and they have resorted to other cheaper and readily available unsafe water supply sources for washing clothes, and personal and household hygiene. The talk concludes with a reflection of lessons the case study offers towards debates on resilience of urban water resource systems and the adaptive capacity of the institutions responsible for urban water supply.

2.30-2.40 **Adriano Mateus Biza**, PhD Fellow at UNESCO-IHE, The Netherlands

The Politics of Water Reuse in Maputo City, Mozambique

Maputo capital city is characterized by clear socio-spatial inequalities in both access to urban water supply, sanitation services, and wastewater infrastructure. This water shortage and lack of access to sanitation is especially apparent in the lower income peri-urban settlements surrounding the 'concrete city' center. Reforms to the urban water and sanitation sector have been unfolding since the 1990s proposing to link water and sanitation through discourse of sustainability specifically by the promotion of water reuse as a solution to fresh water scarcity, lack of access to sanitation services, and exposure to untreated wastewater. This research examines the politics of water sustainability through the lens of wastewater by following the emergence of this solution and queries the distributional outcomes, in terms of how this solution impacts on current inequities in access to water and sanitation for the city's wastewater problems.

2.40-3.15 Discussion: *What considerations are important for equity and resilience as revealed by these cases? What opportunities for learning, collaboration and future research are suggested by these examples (from rural, peri-urban and other contexts in southern Africa)*

3.15-3.30 Tea/Coffee Break

VI. Governance Challenges and Politics: Mobilizing Communities, and Building Transformative Capacity for Resilience/ Adaptation

3.30-3.45 **Dr. Gina Ziervogel**, Department of Environmental & Geographical Science, University of Cape Town

Transformative Capacity: Towards Inclusive, Thriving, and Regenerative Urban Settlements

There is growing acceptance that transformational adaptation is necessary to enable system change rather than relying on incremental adaptation that avoids local disruptions

to climate and other risks. This is particularly the case in urban settlements where disconnection from the systems that support life is pervasive and injustice and inequality play out daily. This paper argues that in order to transform towards thriving social-ecological systems, transformative capacity needs to be strengthened. The paper builds on the rich literature of adaptive capacity, alongside concepts of transformation that are drawn from resilience theory, organizational change and developmental psychology. Reconnection to life-support systems, agency and social cohesion are put forward as three foundational aspects of transformative capacity. A transdisciplinary case study of the FLOW programme in the Bergvliet Municipality, South Africa is used to explore how transformative capacity has been built in practice. The case study explores an innovative programme that works with unemployed urban youth, alongside the exploration and introduction of a community currency in the informal business sector and strengthening cross-scalar interaction between the local municipality and youth. The paper suggests that working across sectors and scales in a transdisciplinary manner is a challenging endeavor but necessary for building inclusive, thriving and regenerative urban settlements.

3.45-4.00 Prof Mary Galvin, Anthropology and Development Studies, University of Johannesburg

Making community based adaptation a reality: different conceptualizations, different politics

In the largest climate march in history 400,000 thousand people took to the streets in NYC to pressure governments to mitigate the effects of climate change by agreeing on target carbon emissions. Mitigation is highly political. Yet, even if emissions are radically decreased, poor people in the developing world will still feel the impacts of climate change-- rising temperatures, changes in seasonality, shifting weather patterns, and drought/ floods—on their lives and livelihoods.

Governments have recognized the need for adaptation internationally by creating the Adaptation Fund and, in some countries, nationally by formulating adaptation plans that typically focus on infrastructure and disaster management. While macro-plans are no doubt important, community level action planning is essential so that communities can cope with the impacts of climate change by becoming more resilient. Community-based adaptation (CBA) has taken-off to fill that gap.

This paper reviews the different ways in which CBA has been conceptualized, with a particular focus on the water sector in South Africa. It examines five sets of actors and shows how their engagement in CBA is driven by their conceptualization of communities, their approach to development, and their own interests. The paper describes the various ways that these actors implement CBA and, on this basis, proposes a typology of community-based adaptation that shows how it is not a homogenous, technical practice but is itself a political endeavor. Findings are based on a three-year research project funded by the Water Research Commission in South Africa. Based on participatory research in four local communities in the Western Cape and in KwaZulu Natal, it studied the applicability of down-scaled GCM and hydrological models for local communities. World class hydrological studies have been conducted that model the various impacts of climate change on South Africa's catchments (Schutz 2012). While these studies are used to inform national, and possibly catchment level, planning, poor communities have

been absent. This multi-disciplinary project “teamed up” hydrologists and climate modelers, NGO practitioners and community based organizations to explore how CBA might bridge the gap between science and society, and between actors working at different scales.

4.00-4.10 Dr. André van Rooyen, ICRISAT, Bulawayo, Zimbabwe

Brokering positive change in complex systems: Can Innovation Platforms facilitate more resilient systems?

Complex systems comprise many and diverse actors, and have numerous subsystems (and sub-sub-systems), often arranged in hierarchical structures. The interactions, transactions, learning, knowledge sharing and feedback mechanisms between the diverse actors result in system behavior which is often path-dependent, non-linear, highly unpredictable and surprising. Bringing about positive change in complex systems can, therefore, be challenging. Innovation Platforms deal with the complexities by bringing together relevant actors to identify challenges and opportunities. Building on the cognitive diversity within the group, the IP unpack problems to: define their root causes, identify systemic challenges (and opportunities), define a common goal, develop an understanding of roles and objectives of the different stakeholders, and seek out constructive partnerships. With a common vision, the group engages in an interactive, innovative process to develop, evaluate and implement changes within the system. The power of the process lies within the systemic approach rather than in implementing single “interventions”. The ultimate aim is to break up the deep structures, allowing positive change and reconfiguring the constellation(s) of actors into self-organizing functional networks where partnerships result in synergies that contribute to the efficiency and adaptive capacity (and resilience) of the system.

4.10-5.00 Discussion and Wrap Up: *How do we work with communities to foster transformative/equitable change? What political considerations are of interest when working towards more resilient and equitable engagement for participatory governance? What is the specific role that equity might play in fostering and maintaining ‘resilience?’*

5:45 Depart for Dinner at Solms Wine Estate (includes farm tour and heritage dinner)

FRIDAY, AUGUST 26 2016

- 9-10.30 Key themes/ Making Connections:** Research to Foster Resilience & Transformation
Small group discussion on key session questions/themes (as detailed above and as revised during the workshop discussions).
- 10.30-10.45 Coffee/Tea Break**
- 10.45-12pm Discussion on key features/indicators of equitable & resilient water governance**
- 12 Lunch at STIAS**

- 1-1.10pm** Nico Elema, AU/NEPAD Networks of Water Centers of Excellence, **SADC Water Science Research Agenda**
- 1.10-1.20pm** Other Funding opportunities and collaborative possibilities (International WaTERS)
- 1.20-2.45pm** **Facilitated discussion** on key themes, emergent research agendas, and connections
- 2.45- 3pm** **Coffee/ Tea Break**
- 3-3.45 pm** **Group Discussion** on relevance and insights for **southern Africa**: building regional connections and collaborative research agendas/ Future needs and opportunities
- 3.45-4pm** **Task List and Follow up items**
- 4pm** **Close and Evening on your own. Optional Walk in Jan Marais Nature Reserve**
Anyone looking for dinner companions can sign up at the registration desk.

Annex II

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Water Equity and Resilience Workshop, Stellenbosch, South Africa, Aug 24-26 2016

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Annex III

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Available in Dropbox (other resources related to the deliverables to be added):

Galvin, Mary. "Making Community Based Adaptation a Reality: Different Conceptualisations, Different Politics." *Third ISA Forum of Sociology (July 10-14, 2016)*. Isaconf, 2016.

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