DEMONSTRATION OF HOW HEALTHY ECOLOGICAL INFRASTRUCTURE CAN BE UTILIZED TO SECURE WATER FOR THE BENEFIT OF SOCIETY AND THE GREEN ECONOMY THROUGH A PROGRAMMATIC RESEARCH APPROACH BASED ON SELECTED LANDSCAPES

Deliverable #6:

31 July 2016

Submitted to the Water Research Commission

by

Centre for Water Resources Research

University of KwaZulu-Natal

Project K5/2354

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ABBREVIATIONS
BEDS - School of Built Environment and Development Studies
CHAT - Critical Historical Activity Theory
CoGTA - Cooperative Governance and the Department of Traditional Affairs
COP – Community of Practice
CWRR - Centre for Water Resources Research
DBSA - Development Bank of South Africa
DEA - Department of Environmental Affairs
DEWATS - Decentralized Wastewater Treatment Systems
DUCT - Dusi uMgeni Conservation Trust
DUT - Durban University of Technology
DWS - Department of Water and Sanitation
DWAF - Former Department of Water Affairs and Forestry, South Africa
EI - Ecological Infrastructure
EPCPD - Environmental Planning and Climate Protection Department
EWS - eThekwini Water and Sanitation
KZN - KwaZulu-Natal
LULC - Land use/land cover
miniSASS – Mini Stream Assessment Scoring System
PRG - Pollution Research Group
PRP - Palmiet Rehabilitation Project
SALGA - South African Local Government Association
SANBI - South African National Biodiversity Institute
SANCI AHS - South African National Chapter of the International Association for Hydrological Sciences
SASS - South African Scoring System
SIP - Strategic Infrastructure Project
TOR - Terms of Reference
UEIP - uMgeni Ecological Infrastructure Partnership
UKZN - University of KwaZulu-Natal
WESSA - Wildlife and Environment Society of South Africa
WRC - Water Research Commission
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1 INTRODUCTION

1.1 WRC Project K5/2354 - Overview

In April 2014, the Centre for Water Resources Research (CWR) and partners were awarded a 5 year research project through a Water Research Commission (WRC) solicited call. The project is entitled:

“Demonstration of how healthy ecological infrastructure can be utilized to secure water for the benefit of society and the green economy through a programmatic research approach based on selected landscapes”.

The uMngeni catchment has become a focus area and pilot study site through various initiatives, now becoming consolidated through the uMngeni Ecological Infrastructure Partnership (UEIP) (SANBI, 2013). Through this initiative, more than 30 government departments, academic institutions, private companies and Non-Governmental Organisations have signed a Memorandum of Understanding which documents their commitment to investing in restoring, maintaining and managing Ecological Infrastructure (EI) towards improved delivery of water-related ecosystem services. The initiative also aims to provide a suite of additional benefits such as job creation, agricultural productivity, aesthetics, cultural benefits, flood attenuation and adaptive capacity to climate change impacts, which will increase the return on investment (SANBI, 2013). Members of our project team, such as WESSA, are also supporting the Umngeni Resilience Project (URP) a climate change initiative in 4 pilot sites in the UMDM region of the Umngeni catchment.

The project seeks to identify sites in the uMngeni catchment at which investment into the protection and/or restoration of EI can produce long-term and sustainable returns in terms of the delivery of water-related ecosystem services. These services could include water quality and quantity and flood protection. In essence, the project aims to guide catchment managers (for information on the Leadership Seminar concept see Appendix 7.3) when deciding “what to do” in the catchment to secure a more sustainable water supply, and where it should be done. This seemingly simple question encompasses complexity in time and space, and in the connections between different biophysical, social, political, economic and governance actors in the catchment (Figure 1)
For example:

- In order to understand whether there is value in “investing” in EI, it is necessary to better understand the potential mechanisms and benefits of this approach i.e. where there is opportunity for investment in the natural infrastructure that provides services, rather than paying for the services themselves; and
- Not only does investment in EI need an understanding of where the EI is found in the catchment, but critically whether the investment will bring a return (a societal benefit) and whether there is a willing partner (be it a municipality, farmer or individual) and the risks associated with the investment.
- The capacity of society to engage, understand and react to opportunities for utilisation or investment in EI is considered a critical success factor. It is this component that we begin to address in this Deliverable.

The approach and deliverables adopted in this project reflect this integrated complexity. The approach towards achieving this is described fully in Deliverable 1 of the project which was submitted in September 2014.

### 1.2 Report Overview

The goal that this Deliverable seeks to address is that of developing and training beneficiaries on appropriate methods (models, guidelines, indicators, procedures) necessary to achieve a paradigm shift to transform society, and the economy, towards a healthy interaction with the ecological infrastructure within the catchment.
The report summarises capacity development approaches, popular articles, and blog sites. Where appropriate links are made to the WRC GroundTruth citizen science “Tools” project WRC K5/2350.

The report summarises a wide range of activities and interventions that sought to achieve this goal. These ranged from live television interviews (eg on ETV news), through street theatre for Ecological Infrastructure, the profiling of the work at large-scale events such as the KwaZulu-Natal Provincial Environmental Summit (9th June 2016) as well as Leadership Seminars (Appendix 7.3) formal (accredited) and not-accredited training. The project included an engagement with senior ministers including the Minister of Water and Sanitation (DWS), The Deputy Minister of DWS while one of our research partners was able to participate in a meeting with the Deputy President.

This report overviews selected key activities of the project and presents the outcomes as a narrative that has made significant contributions towards the project goals. The project has also contributed in raising awareness about and even reducing the amounts of pollution, in the form of nutrients (sewerage) from nearby townships, entering Midmar Dam and the Umngeni River.

In summary this report concludes:

- That meaningful education processes that include a positive engagement with communities and key stakeholders is necessary rather than further awareness raising. Here career-pathing that builds competence is important (Appendix 7.1; 7.3; 7.4; 7.10; 7.11).
- That engagement activities that are practical and applied carry much more weight, effect and meaning than media-centred approaches, or approaches that ‘target others’ for awareness raising in a top-down manner.
- That relationship building is a key component of wise water management processes. In this regard it is usually unhelpful to “oppositionalise” organisations or apportion blame for what is going wrong unless the accountability is part of a positive engagement process. Leadership seminars proved a useful relationship building activity (Appendix 7.3).
- Most notable, in this work, was the importance of citizen science tools that are available to support all participants including local government authorities and community members in engaging with local water related issues and risks.
- Social media communications are invaluable to strengthen cooperation, identify, report on and solve problems. Social media, when used wisely, is helpful in building relationships in communities and with local authorities. In this regard funds have been sourced to enable community workers to receive an air-time allowance to support them to communicate with each other and with appropriate authorities. Face-to-face-meetings, workshops and training courses are crucial to strengthen the communication (For an overview of social media options please refer to Appendix 7.2).
• It is important that the project aligns to the developing policy context that is relevant to this work. In this regard the Sustainable Development Goals (SDG’s), the National Development Plan 2030 (NDP), the Medium Term Strategic Framework (MTSF) and the Spatial Planning and Land Use Management Act, Act No. 16 of 2013 (SPLUMA) are relevant (For an alignment between the SDG’s and the NDP please refer to Appendix 7.6). One project team member, Jim Taylor from WESSA, is also a representative on the UNESCO Global Action Programme (GAP) which provides educational pathways in support for the SDG’s. Aspects of this WRC research initiative were shared at a recent GAP review meeting which was held in Paris on the 5th and 6th of July 2016.

• Finally; meaningful evaluation research is very important to help understand the social change processes that are possible. ‘Realistic evaluation’ studies (Pawson and Tilley, 1997 and Ward, 2016a) as well as appreciative enquiry (Bushe, 2011 and Ward, 2016b) methodologies were found to be most useful and insightful in this research process.

2 PRINCIPLES OF HUMAN CAPACITY DEVELOPMENT THAT SUPPORT LEARNING AND SOCIAL CHANGE

The following principles have been developed in collaboration with Heila Lotz-Sisitka (2005) and the Southern African Development Community – Regional Environmental Education Programme (SADC-REEP) which is managed by WESSA. The principles draw on international literature, as well as the experience of grounded training programmes, to inform meaningful human capacity development (HCD) processes. In terms of a definition of HCD it is important to be aware that capacity is not a passive state, but part of a continuously changing state of affairs.

One could say that capacity is embedded in a flow of life that includes the following elements:

The realization → the desire → the will → the freedom → the ability → the opportunity → the action. In other words, capacity cannot be isolated from other processes of life.

Thus, HCD programmes should:

1. Be relevant and appropriate to the situation and context of the participants.
2. Be aware of, and seek to connect with, the context in which the learning is situated and the topics under consideration.
3. Mobilise, wherever possible, the prior knowledge or understanding that people have so that it can be engaged with, and, where appropriate, challenged so as to un-learn and re-learn to support an enabling ‘learning for change’ environment.
4. Support, where appropriate, community, home or work-place-based learning. The learning needs to relate to the environment of the individual rather than be removed and hypothetical.
5. Offer participants the opportunity to engage in task or practice-based learning so as to strengthen the learning experience. Participants and institutions should undertake ‘learning’ tasks, sometimes called “change projects” that are related to their context.

6. Build on existing strengths and opportunities rather than emphasizing other, ‘from the outside’ ideas or project concepts.

7. Support part-distance learning where appropriate. This means establishing an appropriate mix of ‘work and learn together’ (at a workshop or training session) and then ‘work and learn away’ (in the community or work-place).

8. Support Action Learning (after O’Donoghue; UNEP, 2004 & SADC-REEP, 2012 pg. 24): Rich dialogue opportunities (discussing by, with and amongst participants), practical field-work experiences, reporting on experiences and sharing ideas as well as ‘action taking’ related to the learning. The appropriate interlinking of such processes will strengthen meaningful learning.

9. Encourage the sharing of the ‘tools of science’ or ‘learning tools’ so that participants become confident in using tools to find out about the world around them and use the ‘tools’ to explore and solve problems. An example of this are simple water quality monitoring kits (eg miniSASS, the Clarity Tube and Velocity Plank) that can provide a meaningful research experience that enables people to investigate and deal with a water quality issue.

10. We live in a world where discontinuities are all around us – the degradation of our life support systems, such as fresh water, is one example. Often these are only evident to a select few who are part of the scientific or environmental movements. Learning processes that enable such discontinuities to surface and become apparent to a wider circle of participants, through well designed HCD programmes, are proving highly effective. Such dawning realisations, from within the participants frame of reference, are more effective than externally derived and communicated messages.

The HCD principles are reflected here since they help inform meaningful capacity building and can be applied as an evaluative lens when planning or evaluating efforts to enable more resilient societies and thus the efforts of the project to date.

3 CASES OF HUMAN CAPACITY DEVELOPMENT ALIGNED WITH THE PROJECT

3.1 Threats to our water supply system: Mpophomeni and the Enviro-Champs

For over twenty years sewerage has flowed from Mpophomeni Township into Midmar dam. This is a serious problem for KZN since Midmar dam supplies virtually all the water for Durban and Pietermaritzburg, South Africa’s second largest economic hub. One can even
see the green swathes from the surcharging sewers on satellite images. In an effort to address this issue in a human-centred manner Sbu Khuzwayo (UMDM Municipal Manager), Mdu Mchunu (Working for WESSA and DUCT) and Liz Taylor (DUCT) established the Enviro-Champs\(^1\), through DUCT and supported by WESSA, as an effort to provide a bottom-up and top-down mechanism to change the situation for the better. This was potentially a powerful intervention to work towards transforming society, and the economy, towards a healthy interaction with the ecological infrastructure within the catchment. Tangible results did not come quickly, however.

This report shares the manner in which the issues were engaged with. It also documents the evaluation processes that were undertaken to better understand how the changes in society were coming about. In addition to the formal evaluation studies the above 10 principles of human capacity development were reviewed and used as a lens with which to shape and evaluate future learning programmes.

**3.1.1 Little progress .....**

After three and a half years, and much awareness raising, and productive cooperation, it seemed as though little was being achieved by the Enviro-Champs project in Mpophomeni and other towns around the Umngeni Midlands area. Some successes in townships such as Siphumelele, where large-scale engineering by UMDM, did prevent substantial amounts of sewerage from entering the Umngeni River were achieved (this event was profiled on national television by Carte Blanche). Efforts to transform society, and the economy towards a healthy interaction with the ecological infrastructure within the catchment, the key goals of this project, appeared slow, however. The sewerage and solid waste continued to flow and accumulate.

Concerns about Midmar led to the UMDM and UEIP project partners launching a “Save Midmar” campaign which gathered some momentum although tangible results have not been as good as was hoped for. The Enviro-Champs have, where possible, contributed to the Save Midmar campaign.

The Enviro-Champs had done careful monitoring and had statistics of spillages which they record on a pivot-table in EXCEL. This monitoring record includes when or where the spillages were, who was notified, how long the call-out time took, who fixed the leak, how long before it spilt again, and so on. All the data recorded in the monitoring table is linked to geographical coordinates and social media (such as sms technology and What’s App groups) is used to share the findings with key local government and departmental officials such as those at the Department of Water and Sanitation.

**3.1.2 A tipping point .....**

On the 21st of December 2015 the sewers stopped *continuous* spilling! This is confirmed by the observations of the Enviro-Champs as well as the water quality monitoring and analysis

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\(^1\) An Enviro-Champ is any public spirited person who seeks to enhance the conditions of her or his immediate neighbourhood by addressing environmental problems or by linking the problems to those who may be able to solve them. The emphasis is close and local action for a more sustainable future.
that has been undertaken by members of the project team who are physically sampling the quality of the Mthimzima Stream.

This is a success story but it was not only due to the efforts of the Enviro-Champs. All relevant departments had begun to enhance their efforts to bring about the necessary changes. uMgungundlovu District Municipality (UMDM), Local Municipalities, DWS, Umngeni Water, GroundTruth and WESSA (who provided human capacity development and career pathing for the Enviro-Champs) all helped contribute towards solving the continuous sewerage spillages. The successes reflect on the importance of relationship building which is a key factor in all three pilot sites of the project namely; Midmar region, The Baynespruit and Palmiet area.

3.1.3 Close and local activities
At the moment there are 20 Enviro Champs working in Mpophomeni and Howick (Kwa Mevana and Shiyabazali). They are the “environmental” eyes and ears of the community and also conduct door-to-door education campaigns (over 200 households are visited each month through a structured schedule), awareness raising through dialogue-centred street theatre continues and Enviro-Champs identify and repair leaks where they are able. Where the leaks are too challenging for a lay-persons ability to repair they refer them to the UMDM plumbers with whom they have a good relationship.

3.1.3.1 Key Enviro-Champs activities
The following activities are undertaken by the Enviro-Champs:

i. Door to door education (meeting households over weekends and discussing waste and water issues as well as repairing leaks).

ii. Environmental education training days and stream walks (open to the public – some Saturdays over 90 people attend these walks along the streams)

iii. Saturday Mpops-Kids club every second Saturday

iv. Friday Youth Clubs every second Friday (These are essentially youth groups that are offered by each Enviro-Champs in his or her Ward)

Such face-to-face activities strengthen the social fabric of communities and with the support of social media such as “What’s App Groups,” sms messaging, FaceBook and communities blogs strengthen the social cohesion of the activities (For a detailed review of social media please refer to Appendix 7.2).
3.1.3.2 Mandela Day Celebrations

While many Mandela Day Celebrations worked to clean up litter from streams and stream banks a different approach was taken in Pietermaritzburg. Here the Enviro-Champs from Mpophomeni made efforts to teach people the importance of the streams and rivers rather than simply picking up other people’s litter. To ensure optimum effect ‘learning stations’ were set up along the river. Participants were then able to attend a dialogue session, at each ‘learning station’ and engage with the methodologies being shared. Dialogue with the
group leaders, practical studies and a real-life engagement in a field-work setting proved more meaningful and engaging than awareness raising presentations or communication through media (Please refer to Appendix 7.4 for an overview of each learning station with a photograph and a caption).

Regarded by many as a success story the Enviro-Champs approach is now being up-scaled and replicated in other parts of South Africa including Stellenbosch, Ceres and Pongola. It is imperative, however, that the approach and orientation is carefully understood so as to optimise the potential of the Enviro-Champs experiences and concept rather than assume one can re-create a success without being true to context, local conditions and ideologies. For this reason GroundTruth, WESSA and DUCT commissioned research into what really happened and how we can learn from it. The approach and findings are described in Section 4.1.

3.2 The Baynespruit Rehabilitation Project: Research, education, capacity development, communication and community engagement

The Baynespruit is a tributary of the Msunduzi River and is located in Pietermaritzburg. Its upper reaches are surrounded by formal residential areas, its middle reaches are surrounded by industry and its lower reaches are surrounded by both informal and formal residential areas. In the lower reaches on its floodplain small scale agriculture is practiced. It is, arguably, one of the most polluted streams and catchments in South Africa, subjected to continual inflow of raw sewage, occasional industrial effluent discharges, solid waste (refuse) dumping and atmospheric pollution.

The Baynespruit Rehabilitation Project is a pilot project forming part of the uMngeni Ecological Infrastructure Partnership (UEIP). As its title suggests the aim of the project is restore functionality to the stream and its associated catchment though an integrated approach of research, engagement, capacity development and action. It is led and managed by staff of the Msunduzi Municipality which is the local authority responsible for this area. Several partners of the UEIP provide support to and participate in the project.

As part of the project a number of education, research, capacity development, communication and community engagement activities have taken place. They are listed in Appendix 1, together with a brief reflection by the project manager, on each’s effectiveness. These activities were carried out without explicitly considering or being guided by the principles of human capacity development outlined in Section 9. This makes it especially useful to reflect on them now in the context of these principles. So, what can we learn?

3.2.1 Key learning outcomes
What is most striking in the Baynespruit case-study is the multi-faceted nature of engagements. It combines a broad range of capacity development and communication activities with a very broad range of participants – from meetings and publicity campaigns to field-based monitoring and from pupils to senior officials to business to researchers. The
need for a multi-faceted approach to engaging complex social-ecological system issues is self-evident but is not flagged as a principle in Section 9 – perhaps it should be?

What is also striking is how, through effective interaction, project leadership has been able to influence city-wide policy and strategies including the city trade effluent policy and ‘adopt-a-spot’ strategy. Simply being able to illicit a council resolution that they are able to carry out stakeholder consultation is a major accomplishment. These successes are a largely secured because of an implicit and explicit understanding of many of the principles – they understand the context; they mobilise prior knowledge, and they build on existing knowledge generated internally – in short, they know exactly what buttons to press in the municipality so as to add value.

A third feature has been the ability of project leadership to partner with research institutions and together generate significant knowledge and understanding about the system. This was built on relationships that existed prior to the commencement of the project and which have been strengthened during its course.

Overall, in terms of process each engagement has been carefully thought through so that it is most relevant to particular participants – it is recognised that ‘one-size-fits-all’ approaches are not particularly useful. This speaks to a number of the ten principles of HCD learning outlined above, most notably that each activity is designed to be relevant to the situation and context of the participants. The practical engagement of pupils in mini-SASS exercises and other mini-projects through which they learn about ecosystems on their doorsteps is particularly relevant. Learning by doing is significantly more impactful than learning by listening.

There are three areas where the outcomes might be considered less than satisfactory. The first was the pamphlet campaign. There was, evidently, a very poor response to the circulation of 1 500 pamphlets to local residents and businesses. However, it should be noted that there might have been an impact but not one discernable to project management. That said, pamphlets are not particularly engaging and the lack of response should not be surprising.

Second, the attempts to engage and enlist the participation of industry have been challenging. This is not unique to the Baynespruit case study and there might be several reasons for this. Some industrial concerns are polluters and so see no value in participating, only risk of exposure. Others might consider environmental management as a municipal function and not part of their mandate. Finally, many industries currently find themselves in difficult economic situations and simply do not have the time to engage. While at the large corporate industry level the ‘triple bottom-line’ is beginning to resonate this still needs to occur at the medium and small industry level. Significant thought needs to go into strategies for effectively engaging these industries. Particularly important is developing an understanding of what is of interest or concern to them – engage them on their issues to find common ground.

Third, while there have been some successes fund-raising has met with limited success. Lack of experience in securing funded projects is a likely contributor here. Municipal staff very
rarely develop and market funding proposals – it is not their job. An NGO or research institution could provide significant support in this regard.

3.3 Human Capacity Development in the Palmiet Pilot Study

A range of participatory action research activities have been undertaken by the project team in association with the EU supported CLIMWAYS project. These include:

- Three stakeholder engagement workshops
- Focus group meetings with the Quarry Road informal settlement
- Community survey - Quarry Road informal settlement
- Ongoing engagement with the Quarry Road community over issues that arise concerning the relationship between the river and the community
- Initial engagement to facilitate waste clearing and recycling projects in Quarry Road with Durban Solid Waste and Wildlands Conservation Trust
- Interviews with key stakeholders as part of actor mapping exercise
- Engagement with St Marys School – MiniSASS exercise
- Masters Research into relationship between New Germany industry and the river
- Engagement with the Kloof Conservancy – Take Back Our Rivers project

These were reported in Deliverable 5: Annual Report, but are included in a little more detail in Appendix 7.10 as they are directly relevant to the report.

3.4 The uMngeni School of Water Governance Research

The source of many of the problems we face in the uMngeni River Basin does not lie in failures of our natural or engineered systems; it resides in failures of governance – the failure of our political, social, economic and administrative systems that influence water resource planning, use and management. While our individual and collective understanding of these issues under the umbrella of water resource governance is growing and good knowledge is being generated, there is very little to indicate that this knowledge is reaching and influencing the intended users. Also, there is a need to fundamentally increase social science capacity to engage with the issues. Finally, individual researchers in the uMngeni are currently not unified around a common research agenda.

With this in mind a group of social and natural scientists gathered in February to plot a way forward. The main aim was to allow researchers to get to know each other better and learn about relevant projects that are being undertaken by the researchers. The intended outcome of the get-together was to establish a common identity and identify key research needs and key partners as well as to establish a basis for collaboration and by that to begin the process of establishing a shared research agenda.

For the first session – a one and a half day workshop – a ‘safe space’ was created and participation was limited to researchers rather than practitioners and managers. Participants included colleagues from the CSIR, the Institute of Natural Resources, Monash
South Africa, South African National Biodiversity Institute (SANBI), University of KwaZulu-Natal (UKZN), Urban Earth and the Wildlife and Environmental Society of South Africa (WESSA); there were twenty people in all. While other organisations and individuals are also operating in this space the group did represent a large portion of the water research effort focused on the uMgeni River Basin.

The workshop was a deemed a success and has left the participants with much enthusiasm, and many ideas and tasks. Researchers were able to get to know each other at a personal and professional level. Of particular interest was that at least seven participants were engaged in doctoral research. The range of interests was considerable and was not confined to research. It included direct support for management efforts, capacity development of key stakeholders such as municipal officials and traditional leaders, and a large body of research attempting to unpack the river basin as a social-ecological system.

A common identity was established under the banner of the ‘uMgeni School of Water Governance Research’ linked to the already well recognised uMgeni Ecological Infrastructure Partnership. Recognising that the creation of knowledge is an ongoing interaction between all stakeholders the group were able to identify a broad range of potential research partners and key stakeholders. These ranged from civil society, through NGOs and the private sector to various spheres of government. Finally the uMgeni School of Water Governance Research established the foundations for a common research agenda, creating a short-term ‘to-do’ list, and assigning roles and responsibilities.

Subsequent to the first session a second session was held in June. Postgraduate researchers linked to the uMgeni School presented their projects and received input from other researchers.

3.5 Role of Postgraduate Researchers

The project has strong postgraduate group as detailed in Table 1. This is not unusual for a research project. However, what does differ is the way that students are heavily involved in action research where they interact with local communities, municipal managers and planners, the media, water resources managers and fellow scientists and peers at a meaningful level.

A good example of this which directly aligned with this Deliverable is the World Wildlife Fund Journey of Water (http://www.journeyofwater.co.za/) which took place in May 2015. Postgraduate students were heavily involved in engaging with the celebrities were walking and the media. Several featured in media reports (Television, radio, print etc) and also contributed to the strong social media activities associated with the uMgeni journey (http://www.journeyofwater.co.za/media). See Appendix 7.9 for a more comprehensive list of media links.

Table 1 Postgraduate students active in Project K5/2354
<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Degree</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jean Namugize</td>
<td>2014</td>
<td>PhD</td>
<td>Effects of Land Use on Water Quality of Umgeni River</td>
</tr>
<tr>
<td>Catherine Hughes</td>
<td>2014</td>
<td>PhD</td>
<td>The hydrological benefits of rehabilitation of critical areas catchment - land use change impacts - aliens and degradation</td>
</tr>
<tr>
<td>Simphiwe Ncgobo</td>
<td>2015</td>
<td>PhD</td>
<td>Appropriate spatial and temporal scales for the assessment of global change</td>
</tr>
<tr>
<td>Sesethu Matta</td>
<td>2014</td>
<td>MSc</td>
<td>The value of community based water quality monitoring programmes</td>
</tr>
<tr>
<td>Hlengiwe Ndlovu</td>
<td>2014</td>
<td>MSc (now PhD)</td>
<td>The restoration of Lions River Wetland for improved downstream water quality and quantity</td>
</tr>
<tr>
<td>Sanele Ngubane</td>
<td>2014</td>
<td>MSc</td>
<td>Assessing changes in pollutant loadings to Midmar Dam between 1974 and 2014.</td>
</tr>
<tr>
<td>Silindile Mtshali</td>
<td>2015</td>
<td>MSc</td>
<td>Mapping the extent of invasive alien plants in the uMgeni Catchment</td>
</tr>
<tr>
<td>Jedine Govender</td>
<td>2015</td>
<td>MSc</td>
<td>Impact of water quality degradation in the Baynespruit on farmers in Sobantu</td>
</tr>
<tr>
<td>Nothando Buthelezi</td>
<td>2016</td>
<td>MScAgric</td>
<td>Economic benefits of investment in ecological infrastructure</td>
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<tr>
<td>Semeshan Naidoo</td>
<td>2016</td>
<td>MScEng</td>
<td>The role of ecological infrastructure in the water quality of the Palimiet River.</td>
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<tr>
<td>Nantale Nsibirwa</td>
<td>2014</td>
<td>Hons</td>
<td>Hydrological modelling to estimate water quantity and quality of the Mthimzima Stream</td>
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<td>Nokulinga ZweZwe</td>
<td>2014</td>
<td>Hons</td>
<td>Assessment and monitoring of the water quality of inflows to Midamr Dam</td>
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<td>Silindile Mtshali</td>
<td>2014</td>
<td>Hons</td>
<td>Estimating chlorophyll content in water bodies in the uMgeni Catchment from hyperspectral satellite imagery</td>
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<tr>
<td>Sheldon Gouws</td>
<td>2015</td>
<td>Hons</td>
<td>A water quality profile of the Karkloof River</td>
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<tr>
<td>Sizophilo Mahlobo</td>
<td>2016</td>
<td>Hons</td>
<td>Water quality of Nguklu and Gqishi streams, upstream of Midmar Dam</td>
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</table>

### 3.6 Practice meets science: Capacity development of NRM Programme management

It is estimated that about 7% of South Africa’s mean annual run-off is lost to very thirsty alien invasive plant species. This is about 3.3 billion cubic metres more than equivalent indigenous plant species would consume. This equates to over four times the mean annual run-off of the entire uMgeni River Basin. In a country that is already water insecure this is not a volume we can afford to lose – these invasive plants fundamentally threaten environmental, water and economic security. This is recognised and appreciated by both government and civil society. Established in 1995, the national Department of
Environmental Affairs has a long-running programme dedicated to the removal of alien invasive plants and the restoration of degraded natural ecosystems. It is called the Natural Resource Management (NRM) Programme and comprises, amongst other, the Working for Water, Working for Wetlands and Working on Fire campaigns. The current annual total spend is about R 2 billion, much of it used to create labour-based job opportunities.

Recently the leadership of this programme realised that, in order to improve the sustainability of the programme and its impact, increased buy-in from other government departments, NGOs, local communities and from the large labour force was required – instead of being a programme it needed to become an integrated multi-stakeholder sector. This demanded a move from a technically focused approach to one that embraced in greater detail social, economic and governance aspects of natural resource management.

With this in mind the NRM Programme convened a two-day ‘science meets practice’ workshop in Grahamstown. The entire senior management of the programme participated. As part of the proceedings action-researchers from Conservation South Africa, Rhodes University, AWARD and the UKZN/INR (as part of this WRC project) presented their experiences of supporting the implementation of social-ecological systems (SES) and resilience-based approaches to catchment management in various areas of South Africa.

The response from the NRM managers was unanimously positive and enthusiastic. They identified with and took ownership of terms they had not previously encountered – polycentric governance, diversity and redundancy, slow variables and feedbacks. Why was the response so positive? Quite simply, these concepts informed the many challenges that these managers encounter on a day-to-day basis – how do we secure the buy-in and participation of others; how do we get local land-users to take ownership; how do we deal with uncertainty; how do we learn and communicate as we proceed; how do we connect the dots of cause and effect? The immediate impact of this engagement was more than many of the participants and presenters could have imagined.

These are early steps to establish a foundation for growth and consolidation of the NRM sector, but the first steps have been taken. The next steps are equally challenging – embedding this thinking in the rank-and-file of the organisation and partnering organisations in the sector.

Apart from its obvious success there were two invaluable lessons learnt from this process. The first was that when managers invite scientists into the room and request of them their knowledge, information and wisdom it is far more productive than scientists trying to ‘sell’ their research to managers. Second, like almost all facets of our professional and personal lives, timing is everything – this is an idea whose time has come!
4 TOOLS AND APPROACHES TO HCD

A number of approaches to support HCD and understand it’s context and the processes that unfold as efforts progress have been adopted.

4.1 A Realistic Evaluation

Using a ‘realistic evaluation’ methodology (Pawson & Tilley, 1997) Mike Ward has investigated and scoped the factors that make this work successful (Ward, 2016). Realistic evaluation is a methodology that aims to identify the underlying generative mechanisms that explain ‘how’ the outcomes are caused as well as the influence of context. A framework including context, interventions, mechanisms, enabling factors, inhibiting factors and outcomes, has also been developed by Ward who worked closely with all role-players to develop these enabling and inhibiting frameworks. The difference between interventions; for example citizen science activities, and mechanisms; such as community and individual capacity building, is particularly important for realistic evaluation and thus for the evaluation of the Enviro-Champs concept. It is noteworthy that by focussing on “situated practice” including monitoring and recording data from local streams, the Enviro-Champs were working in a real world context and these “practices” provided tangible examples from which to reach for theory and engage in meaningful dialogue (Kemmis and Mutton, 2012).

In particular Ward has developed four frameworks to guide future work. Each framework outlines a constraining or enabling factor that should be considered in similar community development responses. Of particular importance is how conventional wisdom can be a constraining factor. An example of this is that “Knowledge transfer from those who know to those who don’t” is often assumed to be a desirable and realistic goal. In his research, Ward reveals however, that such awareness raising can at times be a constraining factor in bringing about change for more sustainable water management (Ward, 2016a, pg. 4). It becomes clear that we often need to re-view, un-learn and re-learn our views and styles of working if we are to achieve social change in a way that can contribute to transforming society for a more sustainable future.

The evaluation research also noted how important relationship building and education (or more specifically Education for Sustainable Development - ESD) really is in achieving more sustainable practices. Key in this relationship building was the capacity building programme which included a career-pathing process for all Enviro-Champs (A Case Study of career pathing is attached as Appendix 7.1). The career pathing processes included non-accredited and accredited training. Those Enviro-Champs and community members who were enthusiastic and did well in the non-accredited training (such as a one-day ecology course at Umngeni Valley with WESSA) were offered the opportunity to continue with accredited training courses. These courses included Environment Practices courses (Level 2 and Level 5, where appropriate) which cover ecology and include electives on biodiversity, water and waste management. All courses require participants to undertake a ‘Change Project’ through which they change their work or home-based practices as a result of the insights
received in the training courses. The Change Projects then provide evidence which is assessed towards the accreditation.

4.2 Citizen science tools

The non-accredited and accredited training opportunities provided access to citizen science tools and frameworks (Graham, et.al., 2014) that have had a significant impact in the community. This is illustrated in this comment from the leader of the Enviro-Champs in Mpophomeni, Ayanda Lipheyana:

“I think the tools aid the Enviro-Champs. Before we had the tools the Enviro-Champs were just reporting the manholes. There were no trips with the kids. Citizen Science tools have empowered the Enviro-Champs with knowledge so they can help the community.”

When asked why she thought the Enviro Champs project had worked so well, local councillor Zina Dlamini noted:

“The training. The training is very vital. And the communication with our communities.”

It appears that it was the combination of the access to Citizen Science tools, such as miniSASS (Graham, et.al., 2004) and resource materials in conjunction with the training that has enabled the Enviro-Champs to work with a wide range of community members and in fact broader stakeholders to address the issues that are faced. It is perhaps significant that although both water and solid waste were identified as issues, most of the educational work and subsequent successes in addressing environmental issues have focused on water.

As the work with Enviro-Champs progressed the importance of education was reiterated time and time again. Without learning, as a fellow traveller to the engagement with water and sanitation issues, technology solutions seldom succeed no matter how good they are (Taylor, 2010). It is of little use, for example, to provide people with sanitation solutions without engaging them as to how to use and maintain the systems. An analogy from the motoring industry emphasises this point. If a person is given a new Toyota 4x4 the donation is likely to make him or her very happy. But if she or he is not carefully taught how to drive and maintain the vehicle there is a likelihood of longer term failure! Furthermore, a network of garages and expertise is needed as support processes for the car to remain in efficient operation (good advice, spares, petrol and oil supply, servicing etc.). That is why motor vehicle companies usually establish a community of practice before they launch a new product.

4.3 Communication and Social Media

Communication has been a key component of the effectiveness of the Enviro-Champs. Such activity is well illustrated by local Mpophomeni resident Penz Malinga. Penz has lived in Mpophomeni for most of her life. As a public-spirited person who cares a great deal about community development processes and the environment as a whole Penz takes on many tasks. Most notable amongst these is the establishment and maintenance of a community blog. In this particular blog Penz describes how serious the rat problem has become in

Through her blog Penz reflects stories from the local community. She notes that the blog is quite popular and is read by many local residents. Many of these people largely go unnoticed and there is no platform to give their work and activities a “voice”. At the moment the blog is supported financially by the N3 Toll Commission. Penz uses the blog to reflect the struggles, triumphs and environmental issues in the local community. The material covered is often about issues that people don’t normally have access to. She feels that in sharing such information the blog helps develop a sense of pride and helps motivate people. Since the material is in the format of a blog it has a national coverage and can therefore go beyond the local community. It is notable that with any ‘phone with internet access one can have access to the blog – one doesn’t necessarily need a modern smart phone. Penz points out that for R30 you can buy 100mb of data from any local Spaza shop. For a more detailed overview and social media review see Appendix 7.2.

4.4 Leadership Seminars

Following a socio-ecological review (Rowlands, et.al., 2013) of influential stake-holders and catchment related policies in the Umngeni catchment a series of engagements were established to explore and address capacity needs and opportunities. Engagements with key stakeholders and the identification of their capacity development needs took place and a workshop programme was then developed to address these.

Such workshops, which may be described as ‘Leadership Seminars’ involve those stakeholders who were identified as highly influential and whose work mandate requires a high level of understanding of the environment and ecological infrastructure. A number of Leadership Seminars have been conducted and these have revealed the importance of building relationships amongst government, civil society and the corporate sector. The manner (ideology) through which the workshops are conducted is also very important and this overview defines an approach that supports participants to clarify and address their mandated responsibilities rather than seeking to impose or convey other agendas and responsibilities to them.

It is noteworthy that at each Leadership Seminar a practical field-work activity is undertaken and all participants engage in a hands-on experience in basic environmental analysis, data collection and synthesis. This activity needs to be relevant to the context in which the participants are situated. In most instances the miniSASS (Stream Assessment Scoring System) [www.minisass.org](http://www.minisass.org) proved appropriate to the leadership seminar objectives.

Over the past year over 200 participants, including councillors, traditional leaders, municipal managers, planners and other leaders in society have participated in Leadership Seminars and several project team members have contributed to the training and development of curricula for the training courses. Some of the participants have chosen to undertake NQF Level 2 and Level 5 Environment Practices training and have successfully completed these
For a more detailed overview of the Leadership Seminars please refer to Appendix 7.3.

5 CONCLUSION

The work of the Enviro-Champs are certainly a local success story. Key factors in their success has been bottom-up approaches where “close and local” activities are popular with community members. Top-down approaches are also, where appropriate, proving helpful in addressing issues and risks at a local township level. In this regard the Leadership Seminars with influential councillors, traditional leaders and managers are proving most worthwhile. Training programmes, with a powerful Action Learning orientation (UNEP, 2004) have been consistently implemented throughout the project ensuring that everyone grows in understanding of the challenges faced at a local level or even regional (catchment) level. For the development of a “learning culture” that can support change for a more sustainable society it is essential to help participants build understanding and respond appropriately as different circumstances come into play.

In this work citizen science tools have proved a popular support process to the learning (Dambuza and Taylor, 2015). Relationship building with everyone including local community members, politicians, and senior management with organisations such as Umgeni Water and DWS have also supported top-down approaches that have led to heavy machinery being deployed to sort out serious spilling sewers. From an ideological perspective the work of the Enviro-Champs has been carefully conceptualised through an enabling approach to social change (Taylor, 2014 and Ward, 2016a). This orientation is engaging and inclusive in that it seeks to move away from the often dominating centre-to-periphery approaches that seek to cause change in others through sending messages to target groups.

The “othering” of other members of society, be they community members or government departments, can disrupt efforts to build cooperation and the development of social change towards more sustainable living. It is the unifying efforts, involving all stakeholders and partners, to address challenges that the community faces, that have been particularly gratifying about this project. As Ayanda Lipheyana (the Coordinator of the Enviro-Champs Project in Mpophomeni) notes:

“Although we deal with things like sewage and solid waste that aren’t always considered fun to work with we are finding that the project provides an opportunity for a wide range of people to participate from unemployed semi-literate people to scientists, NGO’s, politicians and government officials. In this regard the project is good for building South Africans and South Africa!”

What has been most significant has been where the citizen science tools are used in the context of the Action Learning that WESSA has been researching and developing with the WRC sister project (WRC K5/2350). When supported by the ten HCD principles of good learning, Action Learning becomes a powerful framework for strengthening social change. Without the tools, however, the Action Learning approaches would be rather limited.
It is notable that over 1 123 participants have undertaken WESSA accredited and non-accredited courses in the past year and most of these have learnt to use the tools in the context of the local water and sanitation issues that are evident at a local level.

5.1 An emerging Community of Practice

A developing community of practice is also important if water resources are to be more wisely managed.

Communities of practice are groups of people who share a concern, a set of problems or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. ... These people do not necessarily work together every day, but they meet because they find value in their interactions. As they spend time together, they typically share information, insight and advice. They help each other to solve problems. They discuss their situations, their aspirations and needs. They ponder common issues, explore ideas and act as sounding boards ... they accumulate knowledge, they become informally bound by the value they find in learning together. This value is not merely instrumental for their work.”

(Wenger, McDermott and Snyder, 2002: 4&5)

Wenger et al (2002) explain that communities of practice involve a unique combination of three fundamental elements:

- A domain of knowledge which defines a set of issues: In the case of the Umngeni catchment we have defined education for sustainability issues relevant to our context (as described above and in our objectives) as the domain of knowledge.
- A community of people who care about this domain: In the case of the Enviro-Champs this includes a variety of stakeholders have started to participate in responding to these issue, and
- A shared practice that they are developing to be more effective in their domain: In Mpophomeni this includes a range of practical activities that include water quality monitoring using citizen science tools, street theatre awareness raising through encouraging situated dialogue processes, workshops and training courses.

•
The 10 HCD principles, coupled with Action Learning approaches and ‘realistic evaluation’ have certainly helped clarify the understanding of social change processes in the contexts of the three sites reviewed in this report, namely: Midmar area, Baynespuit and the Palmiet stream region. Although the indicators of successful social change are becoming increasingly clearer it is important that further research is undertaken to deepen this understanding where appropriate. In this regard where links are made between the biophysical science and the social sciences a stronger orientation for future water management processes is possible. The authors of this report gratefully acknowledge the spirit of cooperation that developed between natural and social scientists in this regard and the willingness of all to share their findings and insights. This form of cooperation certainly bodes well for future water management processes in the Umngeni catchment.

6 References


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7 APPENDICES

7.1 Career Pathing - Career Pathing: A Case Study in Social Learning by Claire Herbst, Shanu Misser and Jim Taylor

7.2 Social Media Insights. First draft for further input by Catherine Ritchie, Jim Taylor, Ntswaki Dlhale and Jenna Dohne

7.3 Capacity for Catchment: Leadership Seminars by Lemson Betha, Jim Taylor, Tembeka Dambuza and Mark Graham

7.4 Mandela Day Celebrations

7.5 Umgeni School of Water Resources Governance

7.6 SDGs and the NDP

7.7 Popular Print Articles

7.8 New SETA landscape

7.9 News and related media showcasing postgraduate activities in K5/2354

7.10 HCD in the Palmiet Study by Cathy Sutherland

7.11 Research, education, capacity development, communication and community engagement activities for the Baynespruit Rehabilitation Project by Esmeralda Ramburran
APPENDIX 1

Career Pathing
A Case Study in Social Learning by Claire Herbst, Shanu Misser and Jim Taylor

“People have no future without water, clean air and healthy food. Today we are celebrating the opportunity to learn about, and care for these resources.”

This was the key message from Siya Lakhani at the DUCT/WESSA graduation ceremony at Umgeni Valley, 22 November, 2014.

Overview
This case study overviews the ‘career-pathing’ journey of community members who have been working as River Care Rangers to rehabilitate and care for the Umngeni river system in KwaZulu-Natal. The participants progressed through a series of training designed to gradually build and grow their skills. Participants began by participating in a non-accredited, one-day ecology course and then progressed to an accredited SAQA NQF Level 2 training in Environmental Practices, focusing specifically on water management. Capacity building opportunities continued through a Training of Trainers National Certificate in Environmental Education and Training Development Practices (or EETDP). The EETDP is an accredited course at NQF Level 5 that equips the learner to offer Training of Trainers courses and to engage with environmental issues using a range of educational methods and approaches.

A notable feature of the training is that it provided opportunities for people to develop their skills and career path opportunities from a situation where they had no training or qualifications at all. Furthermore, it encouraged these people to undertake accredited training at various levels. The ability of all participants who have completed these training processes, to more fully contribute to sustainable practices and to speak capably and engage with the environment and related issues and risks, is noteworthy.

Non-Accredited Training
Non-accredited training is designed to accommodate those people who do not have formal education or training and to ensure that they learn to understand, protect and care for the environment. This project also acknowledges that people who are illiterate do have an understanding of the environment and are aware of the environmental and health issues that occur in their communities. Their understanding and knowledge, however, may need to be strengthened to improve environmental understanding and management and as such the course is designed so that it builds on the understanding people already have about ecology and environmental issues.
Thirty enthusiastic community members from townships around Pietermaritzburg and Howick attended a training course in ecology and life-support systems. They were educated about natural ecosystems so that they can become the ‘eyes and ears’ of the environment and work together, with municipalities and other authorities, to reduce the negative impact our society is having on the environment. The course was thus conducted for enthusiastic township residents who had a desire to improve their local environmental conditions.

The non-accredited training consisted of five phases:

a) **Phase 1 – Selecting and preparation for participants**

In this phase it was important to establish who should attend the training and to clarify the local issues and risks that the training was designed to address. This was done through application forms and interactions with existing networks that DUCT and WESSA has in the identified townships. These networks include the Enviro-Champs, River Care Teams, Eco-Schools supporters and Street Theatre actors.

b) **Phase 2 – Field trip training day**

A one-day ecology field-trip was then conducted. Participants learnt about different species of plants and animals and the role they play in ecology. The course was conducted in isiZulu and covered a basic introduction to waste management and recycling, an introduction to grasses, the identification and overview of indigenous and alien invasive plants as well as wetlands. A miniSASS (a simplified bio-monitoring water testing process) was also conducted. These key knowledge areas were chosen to support the participants’ understanding of their environment and to create an understanding of the environmental issues they face in their communities.

c) **Phase 3–Work away in their work place and communities**

During this phase participants returned to their communities and work places. Here they were able to use the simple reference guides that they had been introduced to during the one-day course. In this way they were able to apply and reinforce the ecology lessons they had learnt on the field trip in Phase 2.

d) **Phase 4 – Knowledge test**
In Phase 4 the participants returned to WESSA Umngeni Valley for a one-on-one knowledge test in isiZulu. The examiner who conducted the test led a conversation to establish the necessary knowledge. Where people were not confident, as was the case with one river care team, they were offered a further two weeks of study and practice after which they returned and mastered the test.

It was important to clarify that the participants understood that the assessment was to evaluate their understanding of the work covered on the training days and not their intelligence and abilities.

This approach was used to try and avoid making the participants nervous or feeling inadequate. The knowledge tests were carried out in an outdoor setting which contributed towards making the participants feel less anxious. The evaluation was conversational, relaxed and included applied knowledge processes in the field. The facilitators who conducted the tests encouraged the participants to draw on their indigenous knowledge, wherever possible, to demonstrate an understanding of basic ecology.

e) Phase 5 – Graduation

A certificate of competence and attendance from DUCT and WESSA was awarded to all 32 successful participants. For those who wished to study further, an accredited course, the NQF level 2 course in Environmental Practices, was offered through WESSA. The non-accredited training started in August 2013 and all training days and knowledge tests were completed by September 2014.

Accredited training

An accredited course is written against a South African Qualifications Authority (SAQA) qualification or part qualification (unit standard(s)) that has been registered on the National Qualifications Framework (NQF). A short skills programme in Environmental Practices, NQF Level 2 was offered to 22 DUCT employees totalling 28 credits. This course has been developed for participants who possess a minimum of Grade 9 and is work-place based aimed at developing the skills of people working in the environment. The content of the training materials was adapted and developed for the context and learning environment of the river care teams. Training was implemented at the Umgeni Valley Nature Reserve, with 14 participants attending in 2013 and 8 participants in 2014. The course takes place over 5 modules, each requiring at least 2 days of contact time and a follow up work/community place based project:
• **Module 1** – *Unit Standard 116064: Recognise and identify the basic functions of the ecological environment (4 credits)*: this is a basic introduction to concepts of environment, sustainable development and ecology;

• **Module 2** – *Unit Standard 119554: Apply Environmental Management Tools to Assess Impacts (5 credits)*: this is a very basic introduction to environmental management in the context of workers and operators in the range of occupations covered by this skills programme; and

• **Module 3** – *Unit Standard 119553: Take action to address impacts on the environment (10 credits)*: this module aims to support the workers to change practices in their occupation towards more environmentally sustainable options.

• **Module 5** -Unit Standard 246463 – The Water Cycle: this module introduces workers to the water cycle and natural systems and processes that keep our rivers, wetlands and water ways clean and healthy (5 credits)

• **Module 8** -Unit Standard 116077 – Water Quality: this module introduces workers to methods for and the importance of monitoring the quality of water (3 Credits)

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**The Accreditation process**

Participants completed portfolios of evidence showcasing knowledge and skills developed through both the contact sessions and back in their communities. Submitted portfolios are then assessed and when they are considered “competent” the process proceeds to moderation and verification from the LGSETA. Once work is verified learners can then be registered with the South African Qualifications Authority (SAQA) to receive their statement of results. Given that accredited part-distance learning (otherwise known as ‘blended learning’) normally only achieves a 20% or less success rate the fact that almost all of the participants completed the course successfully is remarkable.

The following factors may be attributed to this success:

1. The careful selection procedure followed by DUCT which ensured only the most committed participants enrolled for the training.
2. The relevance of the course to the needs of people in areas around our degrading rivers and streams meant that the learning was applied, realistic and reality congruent.
3. The enthusiasm and support provided by the WESSA tutors. This helped keep everyone keep on track despite many difficulties.
4. The support provided by DUCT staff in Pietermaritzburg and by DUCT volunteer members and WESSA staff in Howick.

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**Overall Reflections and Recommendations**
Social learning is one of the most powerful ways of empowering people and ensuring that the learning process is truly their own. Training courses recognised that communities have their own informal learning processes and used these same learning process to introduce and build on their knowledge about the environment and natural resource management. Establishing enthusiasm and commitment of participants prior to commencing the course was important with much effort made to ensure that participants felt comfortable during training days and the evaluation sessions. This is important to enable a sense of respect and dignity for all involved.
APPENDIX 2

Social Media Insights

First draft for further input

By: Catherine Ritchie, Jim Taylor, Ntswaki Dtlhale and Jenna Dohne

Insights from across all social media platforms

Profiling activities across all social media platforms certainly helps raise awareness particularly if water is the focus of the profiling. It is important to encourage project participants and beneficiaries to tell their stories and speak about their experience with water and the project partners. What is significant here is that not only do the social media platforms share awareness of water related issues but they also enable people to grow in understanding of the work they do as they seek to express it in the various media. The learning is therefore strengthened not only in people who may read the post but also in those who submit them.

Coordinating across various social media platforms is also proving useful. We find that at a local level township residents are very active at sharing on platforms such as What’s App but they need access to email for more detailed sharing. When used in a complementary manner the different platforms strengthen each other.

Instagram – Few people are using Instagram in a water management related context. There is thus an opportunity to the water field to develop the Instagram usage so as to visually communicate messages. Instagram can be linked to geotagging. Essentially with geotagging one is able to add ones location to any photo that is uploaded, which in turn will create a photo map of your posts. This shows you on a map where all your photos have been taken. By adding your location, it doesn’t only create a map; it also displays that location above your photo in each post that has been geotagged.

Since people can click on geotagged locations and see all of the posts in that area, this can be another great way to gain followers and interactions. Followers who live and work nearby may be more likely to interact with you or do business with you if they see that you are nearby. You can toggle your location on and off before posting an image. This comes in handy if, for example, you want certain posts to be added to your map but wants others to be left off. You can also search for nearby locations like restaurants, tourists attractions and other businesses.
Twitter – Although Twitter is popular and we have used it in the context of this project we are finding that the content is short-lived. Perhaps one should only use Twitter as a secondary platform, for immediate and very topical news rather than general posts. In one notable event where WESSA supported the WWF “Journey of Water” ten celebrities (including television personalities and other luminaries) were taught about water and catchment management over a three day period. The learning included practical field-work and even included a hike from Midmar Dam to Mpophomeni township, six kilometres away. During the learning experiences and immediately afterwards it was calculated that 22 million tweets were made about the experiences! Although this awareness raising sounds spectacular it is still felt that the content on Twitter is short-lived and does not support an engagement process which is so necessary in the context of social change towards a more sustainable water use model.

YouTube

YouTube video is a powerful tool and it could be used much more in the water field. It is particularly useful when one develops a short video that reflects a once-off event or as an instructional video on how to apply a particular water related practice. One should focus on posting engaging content (quality) rather than on the frequency (quantity) or length of posts.

LinkedIn

LinkedIn could be used much more in the water field. It not only connects fellow professionals but we found it useful to advertise our water capacity building courses on LinkedIn. Linkedin is also an appropriate space to about successful project partnerships so as to attract further support.

WhatsApp

WhatsApp is a popular free social media tool and it’s popularity is growing very fast in South Africa. It was found to be very useful when connecting groups who are water monitoring in townships (eg: Mpophomeni in the KZN Midlands) and in affluent areas (eg: Durban Kloof).

Since up to 100 people can be in a WhatsApp group, and up to 256 if the newly developed Android App is used, this social media has much potential for connecting people and sharing information. In Mpophomeni What’sApp groups monitor surcharging sewers, fly-dumping, alien invasive tress as well as general township issues. Such is the power of these social media groups that the government is seriously thinking of developing free wireless zones in
RDP and other informal settlements (Guy Preston DDG for DEA NRM). Where people can share issues, such as flooding or fire warnings, it can save lives and property.

In a recent research evaluation of a community project Ward (2016) found that where relationships are strong with local government and the water authorities it becomes possible to use social media, most notably WhatsApp, to document and share issues and risks and these can then be addressed by the most appropriate authority or organisation.

FaceBook

Facebook is undoubtedly a really powerful media and is a popular for sharing information. We found FaceBook to be of limited value in communicating with water authorities or with government and local government, however. Where groups on courses jointly formed faceBook of What’sApp Groups, we found that it strengthened their learning and cooperative work a great deal. Social media can, therefore, play a strong role in supporting the development of professionalism in the water field most notably through developing “Communities of Practice.”

Skills development training

We are finding that social media can strengthen skills development training a great deal. Of course it is important to complement the news with quality, engaging images. Group shots of participants, or room shots showing backs of heads facing forward are generally of limited use only. Acknowledging posts is critical to building relationships.

Managing Social Media

The management of social media platforms is extremely difficult. This is due to the multiple media platforms, at times massive traffic in many different directions and the constantly evolving nature of the field and technologies. It is recommended that should an organisations wish to optimise the use of social media they should consider purchasing a platform management dashboard such as Hootsuite. Platforms such as this help track, manage and monitor multiple platforms on a daily basis as well as the distribution of content. There is a ‘lite’ version which is free but offers limited functionality.

It would seem to be helpful to group the use of social media platform according to the following categories:

1. PROFILING (raising the profile of water and wise water management)
2. SUB PROFILES (sharing stories about tools, activities and services) and
3. LEARNING OPPORTUNITIES & CALLS TO ACTION
Appendix 3

Capacity for Catchments

Leadership Seminars

By Lemson Betha, Jim Taylor, Tembeka Dambuza and Mark Graham

“by 2030, South Africa’s transition to an environmentally sustainable, climate change resilient, low-carbon economy and just society will be well under way. South Africa must also realise its full potential of its natural resources” (SA’s National Development Plan)

Following a socio-ecological review (Rowlands, et.al., 2013) of influential stake-holders and catchment related policies in the Umngeni catchment a series of engagements were established to explore and address capacity needs and opportunities. Engagements with key stakeholders and the identification of their capacity development needs took place and a workshop programme was then developed to address these.

Such workshops, which may be described as “Leadership Seminars,” involve those stakeholders who were identified as highly influential and whose work mandate requires a high level of understanding of the environment and ecological infrastructure. A number of Leadership Seminars have been conducted and these have revealed the importance of building relationships amongst government, civil society and the corporate sector. The manner (ideology) through which the workshops are conducted is also very important and this overview defines an approach that support participants to clarify and address their mandated responsibilities rather than seeking to impose other responsibilities on them.

2 Topical policies relevant to the capacity for catchments work include the Sustainable Development Goals, the National Development Plan 2030, the Medium Term Strategic Framework (MTSF) and the Spatial Planning and Land Use Management Act, Act No. 16 of 2013 (SPLUMA). The SPLUMA, in particular, addresses the current fragmentation and ineffectiveness of land use legislation. The objectives SPLUMA include: i) providing for a uniform, effective and comprehensive system of spatial planning and land use management; ii) ensuring that this system promotes social and economic inclusion; iii) providing for the sustainable and efficient use of land; and iv) redressing the imbalances of the past and ensuring that there is equity in the application of spatial development planning and land use management. The National Coastal Management Programme of South Africa (DEA, 2014) is also relevant.
It is noteworthy that at each Leadership Seminar a practical field-work activity is undertaken and all participants engage in a hands-on experience in basic environmental analysis, data collection and synthesis. This activity needs to be relevant to the context in which the participants are situated. In most instances the miniSASS (Stream Assessment Scoring System) www.minisass.org proved appropriate to the leadership seminar objectives.

By May 2015 a total of 6 workshops and one 2 day non-accredited course had been conducted by the WESSA Capacity for Catchments programme which includes partners such as GroundTruth the uMgeni Ecological Infrastructure Programme (UEIP) as well as officials from CoGTA. These workshops were run with traditional leaders, municipal officials (including planners) and representatives from key governments departments.

The workshops included:

- 28 October 2014 – Traditional Leaders UMDM (Mafunze) 34 people attending
- 29 October 2014 – Traditional Leaders UMDM (Amanyavu) 33 people attending
- 05 February 2015 – Msunduzi Local Municipality officials (WESSA) 18 people attending
- 24 February 2015 – Government officials (WESSA) 33 people attending
- 31 March – 01 April 2015 – Planners, municipal officials and other government departments officials
- 22 April 2015 – Traditional Leaders eThekwini (areas around Inanda dam) more than 20 people attending
- 6, 7 October 2015 - Workshops for Mshwathi Local Municipality on ecological infrastructure and miniSASS (20 and 15 respectively)
- 20-22 Oct 2015 – Workshops in the uMzumvubu region (15 participants attending)

Accredited training courses in Environment Practices with NQF Levels 2 and Level 5 were also conducted from November 2015 onwards:

- 4-5 November 2015 – Mkambathini EI training (Level 2) (12 participants)
- 2-3 December 2015 – Mkambathini EI training (level 2) (12 participants)
- 27-28 January 2016 – Mkambathini EI training (level 2) (12 participants)
- 30-31 March 2016 (Level 5) (Level 5 training for government officials) Msunduzi, Mshwathi, Mpofana and Umgungundlovu (15 participants)
- 20-21 April 2016 (Level 5 training for government officials) Msunduzi, Mshwathi, Mpofana and Umgungundlovu (15 participants)
- 18-19 May 2016 (Level 5 training for government officials) Msunduzi, Mshwathi, Mpofana and Umgungundlovu (15 participants)

Planning the Leadership Seminars
To ensure the most effective and inclusive approach possible the following key questions were helpful when designing and implementing the seminars.

To what extent do the capacity building workshops:

- Articulate with and be relevant to the workplace needs of participants?
- Support participants to realise, for themselves and their organisations, the resource use discontinuities (issues, problems and challenges) and support them to develop more sustainable alternatives?
- Support participants to engage with and accomplish their mandated responsibilities?
- Support a developing sense of pride and purpose in participants?
- Strengthen communities of practice and ongoing professional linkages?

Concluding comments

Methodologies used aim to \textit{minimize} the risks to the learning that are often caused by a strong top-down desire to “….. get the message across” and an orientation that treats participants as “others to be informed and changed” (Taylor, 1997). These dispositions can result in a top-down telling of information that fails to engage with participants points of view in a meaningful way (Ward, 2016). It can also put people off who may get the feeling that they are being “preached at” in a patronizing manner. An approach that encourages all participants to contribute and share their knowledge, experience and views is therefore preferable. Additionally, participants are encouraged and assisted to share their experiences, where appropriate, through contributing to a “Stories of change” publication.

References


Appendix 4
Mandela Day Celebrations
Cascades Stream: Pietermaritzburg 18\textsuperscript{th} July 2016
NGO Partners included: DUCT, GroundTruth, WESSA, WWF

Summary:
While many Mandela Day Celebrations worked to clean up litter from streams and stream banks a different approach was taken in Pietermaritzburg. Here efforts were made to teach people the importance of the streams and rivers rather than simply picking up other peoples litter. To ensure optimum effect ‘learning stations’ were set up along the river. Participants were then able to attend a dialogue session, at each ‘learning station’ and engage with the methodologies being shared. Dialogue with the group leaders, practical studies and a real-life engagement in a field-work setting proved more meaningful than presentations or communication through media.

\textit{In the collage below one can see pictures and captions from each “learning station”}.

1. MiniSASS – Biomonitoring in the Cascades stream
2. The Clarity Tube (turbidity) and the Velocity Plank (volume and stream flow)
3. How to fix a leaking tap
4. The Building Blocks of Life. Learning about human dependency on natural resources such as water.
5. Riparian Zones – protecting and cleaning our water-ways
6. Engineering Solutions: Helping our urban rivers and streams become more sustainable
7. Learning how to become an Enviro-Champion
8. Learning about wetlands
9. Street Theatre – engaged dialogue through drama
10. Partnerships for Healthy Rivers: Group Picture
Appendix 5

The uMngeni School of Water Governance Research

A strategy

First Draft: May 2016

1. Context

In February 2016 a group of about twenty researchers with common interests in water resource research met in Pietermaritzburg. There were three primary reasons for this gathering: people wanted to share details of their research and understand what others were doing; there was recognition of the need for improved networking and collaboration amongst researchers, and there was growing concern about the state of the water resources of the uMngeni River Basin.

What ensued at this working session\(^3\) was a process where we:

- Defined the bio-physical reality of the catchment and its water resources – in short, a highly stressed system with rapidly increasing water demand and continually declining water resource quality; a system in which water resource governance is compromised.
- Shared our individual identities and the research we are engaged or interested in.
- Defined our common identity, which we encapsulated as the uMngeni School of Water Governance Research – we are researchers, our geographical focus is the uMngeni River Basin, our focus is water governance and ‘school’ denotes that we are here to learn.
- Identified the platforms for potential collaboration and leverage, and the actors we needed to engage
- Planned a way forward together

2. Guiding principles

The following guiding principles were explicitly stated or implicit in our deliberations

- We are a platform for collaborative research focused on integrating hydrological, ecological, social and engineering research in supportive of improved governance of water resources in the uMngeni River Basin
- While our focus is research we are also catalysts for positive change.

\(^3\) The proceedings of this working session can be downloaded from [http://cwrr.ukzn.ac.za/umngeni-school-of-wgr](http://cwrr.ukzn.ac.za/umngeni-school-of-wgr)
We operate within the broad ambit of the uMngeni Ecological Infrastructure Partnership and take guidance from its individual members and collective membership.

While we do not dictate what research theories, frameworks, models and methodologies should be used we recognise that broad participation in the research process is essential to improve governance. Our focus is integration at both a conceptual and an operational level.

While what we develop must be theoretically and methodically sound it is as important that what we recommend is practically actionable/implementable.

Government, the private sector, civil society and other research institutions are our research partners, not simply recipients of our research.

Central to our purpose is the development of capacity, particularly amongst young post-graduate researchers.

3. Actions/activities

Drawing on the proceedings of the working session and on the UEIP strategy the following collaborative actions/activities have been identified:

Establish conceptual foundations

- Compile a conceptual paper which frames and provides a foundation for our research effort (a group has commenced with this process)
- Refine uMngeni power map (build on WESSA initiative) to focus on governance aspects

Profile the School

- Compile a press statement for broad circulation (this was done)
- Provide strategic input and influence on policies and public debate (particularly as it relates to the current drought)
- Establish a web-based presence (This has been done - http://cwrw.ukzn.ac.za/umngeni-school-of-wgr - thanks to the Centre for Water Resources Research at UKZN)

Promote information/knowledge exchange

- Compile a drought fact sheet for broad circulation and use by multiple partners (This has been done)
- Hold regular presentations on topics of mutual interest
- Write popular articles and opinion pieces for a range of publications (A template for articles has been circulated)
Establish a coordination system

– Establish a core group to carry out secretariat and coordinatory functions (*an informal coordinatory group has been established*)

Secure partnerships

– Establish linkages with the proto-CMA and with the regional office of the Department of Water and Sanitation
– Identify and recruit additional natural/bio-physical scientists into the School
– Build relationships with policy makers, practitioners and advocacy-based organisations

Identify and secure resources

– Identify funding sources and generate appropriate proposals
– Specifically, compile a proposal for submission to the Water Research Commission in July 2016

Develop capacity

– Identify and nurture post-graduate talent (*There are already seven PhD and MSc students and one post-doctoral fellow participating in the School*)
Appendix 6 The SDG’s and the NDP 2030

Mapping the SDG Targets and NDP Objectives

1. NO POVERTY
   NDP Chapter 11
   Social Protection

2. ZERO HUNGER
   NDP Chapter 5
   Environmental Sustainability and Resilience
   Chapter 6
   Inclusive Rural Economy
   Chapter 11
   Social Protection

3. GOOD HEALTH AND WELL-BEING
   NDP Chapter 10
   Health Care for All

4. QUALITY EDUCATION
Appendix 7
Samples of Popular Articles in the Print Media
Appendix 8
New Sector Education and Training (SETA) Landscape – July 2016

Accredited and non-accredited training pathways in support of Ecological Infrastructure understanding and management: Reflections on the evolving SETA training landscape

Introduction
The recently released government Gazette (10 November 2015) entitled “Proposal for the new nationals skills development strategy (NSDS) and sector education and training authorities (SETAs) landscape within the context of an integrated and differentiated post-school education and training system (NSLP-2015)” by the Minister of Higher Education and Training has a number of implications for the Extended Public Works Programmes and other programmes that seek to strengthen understanding related to Ecological Infrastructure.

Recent research into the relationship between skills development within the Working for Water, EPWP and EPIP programmes also suggests that there is a strong correlation between the need to develop more robust learning pathways within the public programmes and the need for occupational pathways contained in the NSLP Gazette. As the service provider for training within the Working for Water (WfW) programme and having been involved in a number of other training programmes within the EPWP and EPIP (e.g. DEA Youth Environmental Services), WESSA, most notably through working with UKZN, is well placed to support such capacity building and in so doing enable WfW, EPWP and EPIP to maximise the impact of training and skills development within the emerging framework outlined in the NSLP.

Background
The Working for Water (WfW) and other Extended Public Works Programmes have a substantial training and skills development component. In terms of the beneficiaries (both contractors and working team members) this is important for capacitating beneficiaries to do their jobs safely and efficiently. It is also important for upskilling beneficiaries in order to enhance their opportunities to secure work outside of the programme. A 2007 study by the Community Agency for Social Enquiry (CASE) and a more recent unpublished masters thesis suggest that the primary aim of training beneficiaries to do their WfW jobs safely and efficiently is directing their skills development inwards, towards being dependent on alien invasive removal jobs and government-supported employment. Training, in general, is not having the effect of opening up alternative employment options for programme beneficiaries. (Richards et al. 2007; Fourie 2016).

A related challenge in terms of longer term skills development has been linked to the loose arrangement of unit standards being used in the training that do not form part of any one qualification or skills programme. Again this seems to limit the work opportunities outside of the WfW programme. (Hough and Prozesky 2010, 2012, 2013)

Given the vital role that the EPWP and EPIP play in achieving a wide range of natural resource management objectives within South Africa, it is obvious that their potential for job creation extends far beyond the government funded public works programmes. As the
Department of Higher Education (DHET) has pointed out, green economy occupations, specifically the elementary type, are a key requirement for building learning pathways that enable and support the transition from public works programmes into the mainstream green economy (DHET, 2012).

The Department of Environment Affairs (2010) Environmental Sector Skills Planning report notes that:

If this [EPWP] training is carefully developed with attention to quality and output value, this presents a significant opportunity for developing entry level skills for the environmental sector, particularly for new potential growth areas and/or for youth development as is currently being identified in green economy and green job strategies (e.g. the projected potential for 140 000 jobs in the recycling industry). For this training to be of maximum benefit, there is a need to further improve the sustainability value of the skills programmes offered, perhaps through linking them to Environmental Practices Learnership Programmes that are linked to sustainable forms of employment. Environmental Practices Qualifications exist at level 1, 2 and 3 on the NQF, and have been registered in LGSETA, but have been very poorly utilised to date. Capacity needs to be developed amongst training providers to provide improved quality programmes and maximise these investments in skills development.

There are a number of systemic issues that need urgent attention in terms of linking the skills development within the EPWP and EPIP programmes and the longer term jobs within the green economy through extended learning pathways. Ramsarup’s 2015 PhD research (in press) has showed that the formal availability and clarification of green occupations was a critical dimension of learning pathways construction in the skills development system, as the definition of occupations is used for the release of training funding in the Sector Education and Training System. It is difficult, if not impossible, to access training funds if the WfW beneficiary and contractor jobs cannot be linked to a registered occupation.

Fourie’s 2016 research (in press) suggests that “firstly there is no occupation listed on the OFO 2013 under which a WfW employee would neatly fit. Secondly, in order to be classified a green occupation, it would be necessary for individuals to undergo at least some environmental training, and currently the WfW job description does not require this.” This means that while the outcomes of WfW and many other EPWP and EPIP work supports sustainable natural resource management, the training of beneficiaries as currently contained in the training matrix does not overtly support the creation of learning pathways towards specific green job opportunities.

The recently released Gazette No.39386 (November 2015 for comment) entitled “The new national skills development strategy (NSDS) and sector education and training authorities (SETAs) landscape within the context of an integrated and differentiated post school education and training system” has substantial relevance for EPWP and EPIP skills development. This document builds on previous work (e.g. DHET, 2014) aimed at “build[ing] an integrated post-school education and training system that serves the needs of
the nation”. A key recommendation of the current Gazette is that the language of ‘occupations’ becomes the accepted terminology for workplaces and learning institutions. In addition, the Gazette recommends that the National Skills Development Strategy IV be occupations-based. The Gazette goes on to emphasise that the language of occupations and occupational pathways must allow learners to progress seamlessly along a learning pathway from school to work or, after a period at work, be able to re-enter the learning system.

Referencing the White Paper on Post-School Education and Training (DHET, 2013), the Gazette makes the link between community colleges and the training and skills development within the EPWP and other public programmes explicit:

Community colleges will have to link directly with the work of public programmes to provide appropriate skills and knowledge. These programmes include the Expanded Public Works Programme (EPWP); Community Works Programmes (CWPs) … Such programmes can provide work-integrated learning opportunities while the colleges provide classroom and workshop-based learning. There is an important role for SETAs in facilitating such partnerships. (DHET, 2013)

This is an encouraging move, and it is recommended that the EPWP, EPIP and other public programmes look to strengthen public and private partnerships with community colleges in order to provide the appropriate environment and necessary support needed for building of meaningful learning pathways into the green economy. The DHET (2013) went on to suggest that these partnerships would take several forms, including building relationships with NGOs, CBOs, local government, and the local economy and labour markets.

**Conclusions**

Based on the recent research presented in this overview and the changing landscape within the post-school education and training sector, it is suggested that the EPWP and EPIP programmes have a unique opportunity to refine and broaden their skills and training offerings. In doing so the public programmes could enhance the long term job prospects of beneficiaries, build occupational and learning pathways in line with emerging legislation and link to new and existing training providers to strengthen the training and skills development within the public programmes.

Reflexive, responsive and responsible strategies will be required from all involved in the education and training environmental sector to ensure consistent, relevant up to date training processes with clear learning pathways and optimal employability. In order to share the current research findings, explore the implications of the proposed legislation and maximise opportunities for the implementation of high impact and relevant training and skills development, it is suggested that the current service provider (WESSA) work closely with the UKZN Ecological Infrastructure project to optimise opportunities that the new legislation is seeking to achieve.
References


Department of Higher Education and Training. (2015). *Proposal for the new nationals skills development strategy (NSDS) and sector education and training authorities (SETAs) landscape within the context of an integrated and differentiated post-school education and training system*. Government Gazette. Pretoria


Appendix 10

CLIMWAYS/WRC – PALMIET PROGRESS REPORT 2015/16

A range of participatory action research activities have been undertaken by the UKZN CLIMWAYS Durban team in the Palmiet catchment in the 2015/16 year to date, including:

- Three stakeholder engagement workshops
- Focus group meetings with the Quarry Road informal settlement
- Community survey - Quarry Road informal settlement
- Ongoing engagement with the Quarry Road community over issues that arise concerning the relationship between the river and the community
- Initial engagement to facilitate waste clearing and recycling projects in Quarry Road with Durban Solid Waste and Wildlands Conservation Trust
- Interviews with key stakeholders as part of actor mapping exercise
- Engagement with St Marys School – MiniSASS exercise
- Masters Research into relationship between New Germany industry and the river
- Engagement with the Kloof Conservancy – Take Back Our Rivers project

These activities are detailed below.

1. Stakeholder engagement process

Emerging from the uMngeni Ecological Infrastructure Partnership (UEIP), of which UKZN and the eThekwini Municipality are key partners, the Palmiet catchment was identified as a case study for researching opportunities for the enhancement of ecological infrastructure to improve water quantity and quality. Out of this was born the Palmiet Rehabilitation Project in 2014 which was initially driven by eThekwini Water and Sanitation (EWS), and which focused largely on technical solutions to improve the condition of the Palmiet and to reduce risk in the lower portion of the river that flows through the Quarry Road informal settlement. However, through the influence of the UKZN’s CLIMWAYS research team, the scope and focus of the Palmiet Rehabilitation Project shifted in early 2015 to water governance along the whole Palmiet catchment. This was supported by a preliminary actor mapping exercise which had been undertaken in the second half of 2014.

The shift of focus to water governance at catchment level, led to the initiation of a stakeholder engagement process with a range of municipal, academic, civic science and community stakeholders. The process was initiated by UKZN and eThekwini’s Climate Protection Branch (CPB) but there has been a shift towards greater leadership and engagement in the process by civic science as the process has evolved. The first Palmiet Rehabilitation Project stakeholder meeting, co-hosted by CPB and UKZN on 9 April 2015, was a technical workshop with stakeholders from eThekwini Municipality, UKZN, DUT and the founder of civic science group, Palmiet River Watch. The meeting focused on stakeholders’ interest in the Palmiet, their role in the project and expanding stakeholder involvement to take the project forward. It was agreed that a participatory governance
model should be used with an emphasis on action. The relationship between the state and non-state actors was discussed, with the research community (UKZN, DUT, DUCT) identified as the playing a pivotal role in connecting the community with the Municipality. The dire waste situation in the Quarry Road informal settlement was raised as a high priority issue.

The second stakeholder engagement workshop, also co-hosted by CPB and UKZN, was held on 18 November 2015 with a wider range of stakeholders including the technical stakeholders from the first meeting, representatives of the Quarry Road informal settlement, other local residents, and a good representation of civic science, including conservancies, Palmiet River Watch, WESSA and DUCT. The absence of local councillors and the business community was noted. After information sharing on the project and its context, participants discussed a range of questions relating to governance in the catchment and the governance model put forward at the technical workshop. This was followed by a groupwork exercise (mixed stakeholder groups) to identify stakeholders’ critical issues concerning the Palmiet River, the opportunities for and constraints to responding to these issues, and their vision and goals for the river. The purpose of this exercise was to use the stakeholder responses to develop an action plan for the Palmiet. At the end of the meeting River Watch invited the stakeholders to attend a River Watch Meeting in January 2016, to inform on the current status of the river. CPB meanwhile summarised all of the stakeholder contributions into a draft concept note and action plan for the Palmiet.

In January 2016 the UKZN CLIMWAYS team met with CPB and River Watch to discuss and plan the next meeting. Although initially planned as a River Watch meeting, it effectively became a combined Palmiet Rehabilitation Project meeting between River Watch, CPB and UKZN, indicating an important shift in the governance process and a strengthening of the role in and commitment of civic science to the process. River Watch placed an article in the local newspaper inviting stakeholders to the meeting and UKZN/CPB invited their stakeholder list as well. The three parties co-chaired the meeting, held on 21 January 2016, with CPB and UKZN providing an overview of the project progress to date and the intention of the meeting to move towards an action plan. River Watch then provided a presentation on the context of the Palmiet in eThekwini and the range of challenges facing the river, including multiple ways of measuring river health. UKZN added the specific challenges facing the Quarry Road community, particularly in light of the recent flood events within the context of a national drought situation. The draft action plan developed by CPB was then reviewed by the stakeholders in a mixed group work session. All the stakeholder inputs are in the process of being combined into a final draft action plan by CPB, UKZN and River Watch.

The next step in the stakeholder engagement process will be the setting up of a smaller stakeholder group, or Community of Innovation, to refine the action plan and take the process forward. It is intended that broader stakeholder meetings will take place about every six months.

2. Focus group meetings - Quarry Road informal settlement
Following initial engagement with the Quarry Road informal settlement in the second half of 2014, the CLIMWAYS research team hosted two focus group meetings at UKZN on 24 February 2015 with members of the Quarry Road area committee. The aim of the focus groups was to explore the governance context of the informal settlement, the key challenges faced by the community, their relationship with the Palmiet River and their perceptions around these issues. The focus groups started with a discussion of context and history of the settlement, their reasons for living there, challenges they face, including service and social facility related challenges. The discussion then shifted to the relationship between the community and the Palmiet River – how the river is used, how it benefits the community, challenges caused by the river, the history of the river and how the relationship with the river could be improved. More specifically the community was asked about flooding and how it impacts on the community, as well as their understanding of climate change. The focus group was rounded off with a discussion on governance issues including their relationship with the Municipality and the ward councillor, and the nature of community protests. These focus group meetings deepened the team’s understanding of the community as well as playing a key role in building a trust relationship for further engagement.

Another focus group meeting was held on 15 January 2016 in the informal settlement when a visiting team from the 100 Resilient Cities programme was invited to meet the community. The focus group meeting explored questions on risk and resilience and was used as a means of ground truthing some of the themes that had emerged in the 100RC stakeholder engagement.

3. Community survey - Quarry Road informal settlement

More detailed household research was conducted in the Quarry Road informal settlement in March 2015 by the CLIMWAYS research team in conjunction with a visiting PhD student from the University of Amsterdam. A total of 100 surveys were administered by the team. The survey included questions relating to household social and economic status, rationale for settling there, health and social networks, quality of housing, personal assets, services provision, governance relationships, and emotional well-being.

Ongoing engagement with the Quarry Road community

Since project inception, the CLIMWAYS team has been engaging with the Quarry Road community mainly through its area committee members, not only through the more formal research activities discussed in 2 and 3 above but also in a more ad hoc manner as specific issues arise. Regular meetings have been held with committee members to discuss issues that have arisen as a result of the relationship between the community and the river.

High risk situations related to the relationship between the community and the river have also resulted in the CLIMWAYS team/Cathy Sutherland acting with and on behalf of the community to attempt to resolve or lessen the impact of these crises, by engaging with the Municipality. For example, two flooding/storm incidents in January 2016 resulted in the loss of several homes and property and a tree falling onto one of the community ablution blocks.
Cathy has been in touch with multiple departments in the Municipality to get municipal help for the community. The CLIMWAYS team is also initiating an engagement with the community to address their concerns relating to a snake in the river which has already bitten a child, and which is starting to transform into the risk producing snake associated with cultural constructions of nature.

4. Waste clearing and recycling projects in Quarry Road

Complex governance problems concerning the relationship between the Municipality and the Quarry Road informal settlement around waste collection and illegal electricity connections has meant that waste removal in the community is limited. Consequently the majority of the waste generated by the settlement is ending up in the Palmiet River with consequent health and safety risks. The CLIMWAYS team started engaging with Wildlands Conservation Trust (WCT) in October 2015 to look into the opportunities for initiating a wastepreneur programme in the settlement. A follow on meeting was held at the informal settlement in November 2015 with WCT and DSW to discuss waste clean-up opportunities. DSW is planning a one year Expanded Public Works Programme project in the settlement to clear the waste using local community members. Once the project has been approved by the Municipal Manager, the CLIMWAYS team plans to host a meeting of the community with DSW and WCT to plan an approach going forward which can dovetail the clean-up with recycling opportunities.

5. Interviews with key stakeholders as part of actor mapping exercise

A range of Palmiet stakeholders were interviewed in the second half of 2014 as part of an actor mapping exercise, including local conservancies, the Palmiet Nature Reserve, Palmiet River Watch and the eThekwini Environmental Health Department. Further interviews were held in 2015 with the councillor for ward 23, the eThekwini Housing Department, eThekwini Water and Sanitation (Pollution and Environment Branch) and the uThekwane Conservancy (the last two as part of research into the relationship between New Germany industry and the river – see 8 below).

6. Engagement with St Marys School

As part of the wider stakeholder engagement process, the CLIMWAYS team also worked with the St Marys School in Kloof to conduct a water quality (miniSASS) assessment in the upper part of the Palmiet catchment with the assistance of the Palmiet River Watch. Three groups of grade 11 learners from the school conducted water quality assessments on 4, 7 and 8 May 2015. The results were uploaded to the miniSASS website.

7. Masters Research into relationship between New Germany industry and the river

The CLIMWAYS project is funding the research of a Masters student, Nolwazi Ntini, into the relationship between New Germany industry and the Palmiet River, using the hydro-social cycle literature as her theoretical framework. The research started in December 2015 with two contextual interviews with EWS and the uThekwane Conservancy and further
interviews are planned for February 2016. It is hoped that the research will facilitate the engagement of industry in the Palmiet Rehabilitation Project stakeholder process, which so far has been lacking at the stakeholder meetings.

8. Engagement with the Kloof Conservancy – Take Back our Rivers project

An interesting development in the latter part of 2015 is the Kloof Conservancy’s proposal, in partnership with the eThekwini Conservancies Forum, to initiate a “Take Back our Rivers” project to determine the condition of eThekwini’s rivers using the ‘river walk’ approach and then to initiate restorative action and education. The conservancy has submitted a funding proposal to the UNDP which is strongly embedded in a climate adaptation framework and aligns with work that the Municipality and the CLIMWAYS team are doing through this and the WRC project/UEIP. The Palmiet River is one of three rivers chosen for the first phase (90 km of river) of the project. The CLIMWAYS team and CPB met with the Kloof Conservancy on 1 February 2015 to engage further on the project and to discuss synergies with the work being done in the Palmiet Rehabilitation Project and by the Municipality through other programmes like the Green Corridor project. The Kloof Conservancy will be one of the members of the Community of Innovation that is being set up to steer the Palmiet Rehabilitation Project forward.

9. Engaging with other related processes

Catherine Sutherland presented a seminar, undertook a fieldtrip and facilitated a group discussion on 11 September 2015 as part of the World Social Science Fellows Seminar Series on Sustainable Urbanization Urban governance with a focus on urban poverty and environmental sustainability Durban, South Africa. The core seminar question: What modes of urban governance are emerging across the developed and developing world to demonstrate that it is possible to tackle the underlying challenges of urban growth, urban poverty and environmental unsustainability? She participated in this seminar series as part of her commitment to MILE and sharing knowledge from the WRC project with the Municipality and its partners.

Catherine Sutherland presented a paper on environmental services in the Palmiet River as an invited speaker at the ICLEI-DAC workshop held in Durban in October 2015. This was a partnership between ICLEI – Local Governments for Sustainability– Africa and eThekwini Municipality. There were over 200 delegates at the workshop from more than 21 countries. Over 75% of the participants were from 16 countries in Africa. Local government participation along with academics, NGOs, private sector, development partners and institutions, meant that there was fruitful discussion, learning, networking and transfer of lessons across the continent.

Catherine Sutherland presented a seminar on ecological infrastructure in the Palmiet River on 03 December 2015 to a group of Town and Regional Planning students from the University of Botswana who were on a study tour to Durban.
Appendix 11

Research, education, capacity development, communication and community engagement activities for the Baynespruit Rehabilitation Project.

Esmeralda Ramburran

August 2016

Education, Research and Capacity Development

<table>
<thead>
<tr>
<th>The two Honours’ students and Two groups of Third year students of 2015 and 3 masters students (2016) working on the Baynespruit – 1 from Hydrology (Microbiological assessment of the Baynespruit linked to health of Sobantu community who used to irrigate crops with the water from the Baynespruit) and 2 from Geography and Environmental management (To assess the health and ecological infrastructure of wetlands and to investigate potential rehabilitation measures: Case study of the Baynespruit, Pietermaritzburg, KwaZulu-Natal) and A comparative analysis of the environmental perceptions of local communities relating to water pollution. Case studies of the Maryvale, Jika Joe, Gomoro and Slangspruit informal settlements in Msunduzi.</th>
<th>We have partnered with UKZN to develop academic projects which can contribute to the knowledge needed in the work environment on the Baynespruit. This has been a successful partnership between UKZN and Municipality as the research coming out from the projects has directly influenced some of the undertakings of the project and has been the initial grounds for motivation for resources into certain areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esmeralda presented a talk on the Baynespruit to Eco-Schools with Pandora Long at the Botanical Gardens on the 25th February 2015</td>
<td>Eco-Schools has played a supportive role in giving schools recognition for work and projects undertaken which has assisted us with aligning our needs to their focus projects which has been successful.</td>
</tr>
<tr>
<td>A MiniSASS assessment was done with additional learners of the Heather Secondary School Eco-Club on the 21st of February 2015.</td>
<td>The MiniSASS has been successful as this has been linked to schools life sciences curriculum and has maintained the curiosity of learners to pursue this further and see more options that can be studied at university. Teachers and learners as well as municipality has mutually benefitted from this.</td>
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Communication

<p>| We have a resolution from Full Council approving public consultation | Successful. Having the Council resolution has allowed us to not encounter any |</p>
<table>
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<tr>
<th>Activity</th>
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<tr>
<td>hindrances in the course of our work and has meant that we have the co-operation of all council employees at all levels and all departments within council to assist and draw on this assistance as any time.</td>
<td></td>
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<tr>
<td>Currently working on putting a media release together for the Witness (local newspaper)</td>
<td>This has been successful in drawing attention to the project as up until July 2016 we have still received calls and emails from the public regarding the Baynespruit having referenced the article. Students at high school level are using the Baynespruit as mini research projects based on the article published in 2014. While this has been slightly less successful in terms of industries contributions it has assisted us with the initial engagement with them when briefing them on the project.</td>
</tr>
<tr>
<td>Attended an ecological infrastructure workshop hosted by WESSA for Msunduzi Municipality on 05&lt;sup&gt;th&lt;/sup&gt; February and again on 24&lt;sup&gt;th&lt;/sup&gt; February 2015. Various Line Departments attended and made commitments to better manage ecological infrastructure</td>
<td>This was mostly successful but could have been more successful provided the water and sanitation unit had attended but this did allow for other internal departments to understand what we do, what ecological infrastructure is and why it is important.</td>
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<tr>
<td>Discussions with Msunduzi Municipality’s Waste Management Department has resulted in a number of strategies to better manage waste; (i) Integrated waste management policy being finalised, (ii) KPCA “Adopt-A-Spot” registration forms have been re-drafted in conjunction with the environmental management unit, (iii) Other strategies being explored are: lowering the landfill site tariff, extending existing recycling programmes and extending the areas of formal waste collection.</td>
<td>The waste department has indeed supported the project and has successfully extended their recycling initiatives within council buildings and to other small scale recyclers. They have also extended the areas of formal waste collection which has made a difference to the Sobantu area along the baynespruit. The ‘adopt a spot’ registration and lowering of landfill tariffs are still in process of being addressed.</td>
</tr>
<tr>
<td>Met with Umgeni Water on the 26&lt;sup&gt;th&lt;/sup&gt; January 2015 to discuss trade effluent discharge permit processes and to co-ordinated efforts to meet with industries through the Pietermaritzburg chamber of business</td>
<td>Successful. Gathering much needed information around the trade effluent permits has led to the drafting of the trade effluent policy for Msunduzi municipality.</td>
</tr>
<tr>
<td>An article on the Baynespruit project has been published in the Sustainable Infrastructure Handbook. Our Marketing and Communications Unit will provide a hard copy as soon as this is available.</td>
<td>This has been successful in establishing and reiterating the baynespruit as a priority project for Msunduzi municipality as it has the political stance and backing.</td>
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| Met with DUCT on the 10<sup>th</sup> March 2015 to | Successful as we resolved the query of small
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<th>Discuss collaboration on similar initiatives to monitor and report on sewer problems on the Baynespruit and Duzi. (Green Corridor Network)</th>
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<tr>
<td>Scale agricultural gardens needing lease applications as well as converting municipal open spaces into recreational and functional areas which can be rejuvenated and thus used more often to notice any infrastructural problems which can be reported and fixed much sooner.</td>
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| The accurate location of the sewer network was to be plotted spatially (GPS Points) and linked to a database to facilitate monitoring and reporting. The Water and Sanitation unit has most sewers already mapped which they will make available. This spatial layer will be refined and updated and work is currently underway to design a reporting protocol and forms for community volunteers. |
| Field work for the identification and mapping of storm water infrastructure has been completed. |
| The accurate location of the sewer network was to be plotted spatially (GPS Points) and linked to a database to facilitate monitoring and reporting. The Water and Sanitation unit has most sewers already mapped which they will make available. This spatial layer will be refined and updated and work is currently underway to design a reporting protocol and forms for community volunteers. |

| Met with Umgeni Water on the 03 September 2015 to discuss illegal trade effluent discharge and permit processes. A Consolidated Bill between Umgeni Water and Msunduzi Municipality was given to the industry for the cost of remedial damage caused by an enormous influx of industrial effluent discharge to Darvill WWTW. |
| A rain water harvesting proposal has been drafted by E. Ramburran and M. Gopaul of this Unit and sent to Illovo Sugar (Marilyn Govender of SASA is the contact person) for their comment and approval to assist the small scale urban agricultural gardens and farmers in Sobantu. This will also contribute to the sustainability of livelihoods as these gardens provide the Sobantu community’s feeding programme consisting of currently 150 people. We are waiting for a response from Illovo. |
| A rain water harvesting proposal has been initially delayed through channels of communication but a contact person has since been established. The initial feedback on the proposal which was considered was not accepted. We engaged the Msunduzi CMF to discuss a way forward and document any ideas however this was not successful and we received no assistance. We then on our own undertook to draft a response strategy to solve the problems Illovo had raised which was more successful than engaging with forums and this is currently with them for engagement, discussion and consideration. |

<table>
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<tr>
<th>Idea’s regarding the revamping of the Call Centre -to enhance effectiveness of communication of reported incidences so</th>
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<tr>
<td>In discussion with the call centre manager we were able to introduce our project and were informed of a revamp that they were</td>
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| Successful. Field work for both sewer and storm water infrastructure has been done and entered into a spatial GIS system. We can now create a database that monitors each point on the ground so that incidences reported can be addressed faster. |

| Successful. Has led to the drafting of the trade effluent policy. Industries having to take responsibility for cost to remediate environmental damage is important to ensure that records on file indicate the type of effluent discharged, whether or not the industry is even producing effluent and can form a basis for information necessary for prosecution of repeat offenders. |

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<th>Event Description</th>
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<tr>
<td>Issues on the ground can be dealt with faster was submitted to the Msunduzi Municipality’s “Big Idea” as notification was received through corporate communication.</td>
<td>already looking to undertake. As soon as budget is made available they will look to initiate an application that would synchronise their processes which will address our concerns raised.</td>
</tr>
<tr>
<td>Deputy Minister of EA Mrs Barbara Thompson visited for the International Day of Biodiversity Celebrations.</td>
<td>The Deputy Minister of EA Mrs Barbara Thompson visited for the International Day of Biodiversity Celebrations. Her priority was to see a case study of improvement of biodiversity and the Baynespruit was the showcase site. From the Deputy Ministers site visit of the Baynespruit held on the 22nd May 2015 there may be potential to gain funding to support various aspects of the project. Ms. Pamela Kershaw of the Department of Environmental Affairs has indicated that “A formal request has been submitted and is on its way to Dr Guy Preston, Deputy Director General: Environmental Programmes to avail officials in the Local Government Support unit to assist with efforts to rehabilitate Msunduzi in preparation for the 2017 International Canoe Marathon, which would include support to the Baynespruit Rehabilitation Project, as committed to by the Deputy Minister at the 22 May 2015 IDB celebrations”</td>
</tr>
<tr>
<td>Applications for funding are on-going to DAC (Durban Adaptation Charter).</td>
<td>Less successful as no response or financial support has been obtained through the DAC to date.</td>
</tr>
<tr>
<td>Attended Day 4 of the Journey of Water Campaign on the 14th May 2015</td>
<td>Being involved with The journey of water campaign was a successful initiative to spread the message of conserving water. Due to the celebrity high profile attendees it assists with leveraging attention to the project.</td>
</tr>
<tr>
<td>Duzi Expert Focus Group meeting on 21st July 2015</td>
<td>Was initially successful to develop strategies to problems whether short or long term solutions are found. It has been very long since a meeting has been held and this may be discontinued.</td>
</tr>
<tr>
<td>A clean-up initiative was done by Northbury School at Khan Road along the Baynespruit</td>
<td>This was successful as the school has adopted the area around them and strives to keep it clean not only on this one day but as often as they can within safe and reasonable measure.</td>
</tr>
<tr>
<td>Submitted a Baynespruit background</td>
<td>This was successfully presented and well</td>
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</table>
A presentation which was presented at the SALGA COP21 United Nations Convention on Climate Change.

The rehabilitation of 2 wetlands within the Baynespruit catchment has been included as a project on the IDP budget process plan for the next 5 year scorecard.

Raisethorpe Secondary School celebrated their 50th Birthday and included the Baynespruit and MiniSASS work in their communications.

We are currently in the process of downloading and using Google Earth for uploading events for the Baynespruit Rehabilitation Project but are awaiting the installation of software from our ICT Department.

Trade Effluent Policy still being drafted

Storm water management policy still being drafted

**GEF Funding** proposal submitted and a recent meeting ensured they would be willing to make a contribution to a component of the project

**Community involvement/public engagement**

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<td>1500 Pamphlets handed out to communities along the Baynespruit</td>
<td>This was the least successful. Although we did this to each home and or industry face to face talking to them about the project – not just dropping them off and leaving – we did not receive any positive response from anyone to date.</td>
</tr>
<tr>
<td>Letters and pamphlets hand delivered to industries along the Baynespruit.</td>
<td></td>
</tr>
<tr>
<td>Met with a representative from the Sobantu community of ± 20 volunteers who have</td>
<td>The volunteers have been difficult to contact and therefore this has been less successful.</td>
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This is a successful way forward as this shows our prioritisation of ecological infrastructure and the intention of addressing wetland rehabilitation within the next 5 years so that budget can be obtained.

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This was successful as educators informed us of happy parents of those grades of learners involved in the MiniSASS training.

This has been successful with those whom we have shared uploaded information with.

This is now being circulated internally for comment which will then be submitted to council for approval.

This is still in concept phase, however other initiatives to address storm water management are being investigated such as rain water harvesting, gardens etc.

This has been successful as there is funding commitment being made available through the ecological infrastructure fund. We are in the process of finalizing a business plan which is to be submitted to them so that we can see where budget can be allocated.

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| expressed interest in alien plant clearing, sewer monitoring and litter clean up. | successful. However when the EcoChamps programme is running we will resurrect the engagement with them. |
| Have met with four industries (Anchor Chemicals, Midlands Builders Suppliers, Afgri Animal Feeds and TDM) of which they have agreed to contribute to the project. | This was successful as we have the commitment from these industries to date. |
| A MiniSASS workshop with the surrounding Northdale community is planned for the 08th November 2015 | This was successfully held at JMR Church on 2 separate occasions. 1 internally with JMR and one with the community. The broader community did attend the training as we did have a larger attendance. The community has adopted the area and do keep it clean. |
| A volunteer group looking to start recycling initiatives submitted a proposal and they have been asked to now prepare a business plan to support funding applications. | We did provide assistance with the proposal and setting up a meeting with the manager of waste. They are currently still recycling. |
| A meeting was held with Ms. Melanie Veness, the CEO of the Pietermaritzburg Chamber of Business, to strategize a way forward with regards to engaging with member industries. A list of industries details were sent to her for her engagement with industries with reference to the Baynespruit rehabilitation project. We are awaiting her response and feedback. | This was successful as we have received all industries information which are a part of the Chamber and have done a presentation to them. We will work on planning and hosting a workshop with industries. |
| Small scale recyclers are submitting proposals and business plans to Council for approval to collect from areas allocated to them by the waste management department. | This was successful as the waste department has engaged with small scale recyclers and they have approval to collect waste from council. |