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Content

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Reflections on Developing Transdisciplinary Learning Pathways for Climate Adaptive Water Governance in South Africa

Abstract

In the spirit of sharing hybrid praxis from the front line, I offer a positioned reflection on a climate change adaptation initiative that involved a particular type of 'two-legged' activity[2], namely, an attempt to develop a transdisciplinary approach to co-researching good adaptation practices in the South African water resources sector. As a new mode of knowledge production, transdisciplinarity has been conceptualised as being capable of producing both practical, useful knowledge for solving real-world problems as well as theoretical, scientific knowledge for better understanding our complex world. Climate change; natural resource depletion; soil degradation; food insecurity; increasing poverty; water and energy crises, are just a few examples of such complex societal problems warranting a transdisciplinary response. In this paper I consider the opportunities that were opened up by taking a transdisciplinary research approach in the context of progressing climate adaptive water governance in South Africa, within the setting of a research project funded by the South African Water Research Commission. I explore the contribution of individual skilfulness and serendipity as well as the difficulties that were encountered as a result of politics, personal interests, misunderstanding, miscommunication and structural constraints and limits, including institutionalised ways of working. By reflecting on four cycles of adaptive management and learning over a 3.5-year period, I note how assumptions

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1 This story is told by John Colvin, reflecting his experiences with the project in consultation with Tonnie van der Zouwen.

2 The metaphor of 'two-legged' is taken from a quotation by Francisco Varela, in which he suggests that "scientific understanding and practical experience are like two legs without which we cannot walk" (Varela, Thompson and Rosch, 1991 p. 14).

at the beginning of the research shifted during the inquiry process of the research, in response both to external developments and to the application of reflexive rigour to ongoing praxis. I conclude with recommendations to key actors in this rapidly developing field of practice within South Africa, as well as a set of broader reflections which I hope will be of interest to fellow reflective hybrids.

Keywords: framing, transdisciplinary research, learning pathway, climate change adaptation, adaptive research

1. Introduction

We are living through a period of profound and transformational changes in which human and planetary futures are becoming increasingly interwoven – the so-called Anthropocene (Berkhout, 2014). Within such a moment, the role of those who can act as leaders and institutional entrepreneurs of sustainable transformational change is brought to the fore. In this paper I narrate and reflect upon a story of situated hybrid reflexive practice in the context of addressing climate change adaptation, one of several dynamics at the heart of the Anthropocene. In doing so my intention is to critically engage with fellow reflective hybrids on the nature and intent of our practice in this moment of planetary evolution.

Over the past 10 years, humanity has been learning to come to terms with the realities of living on a planet which is now subject to anthropogenic climate change, that is, climatic changes which are the direct result of human activities. For many in the global South, the realities of increasing climate variability are experienced as weather-related shocks of increasing unpredictability and intensity, whether in the form of floods, droughts, hailstorms, heatwaves, periods of unseasonal cold and/or the disruption of traditional seasonal climate patterns. For many in the global North, the impacts are less intense, yet there are now few who are unaware of global climatic changes and their local manifestations.

Because of the highly uneven distribution of its impacts globally and within societies, climate change is highly charged politically. This in turn has led to multiple ways of 'framing' climate change, from narratives of denial through a wide range of different solutions, each benefiting different sections of human society and in different ways. 'Framing' is concerned with different ways of understanding or representing a social, technological or environmental system and its relevant environment and is always shaped by political and normative values. Leach *et al.* (2010) highlight that there is a pervasive tendency – supported by professional, institutional and political pressures – for powerful actors and institutions to 'close down' around particular framings, committing to particular pathways that emphasise stability and control. In so doing, these often create universalizing and generalizing approaches, which in turn can obscure or deny the reality of alternatives, particularly those which benefit the vulnerable. Yet addressing the full implications of the fact that we are now living in a highly dynamic and uncertain world requires 'opening up' to methods and practices that involve flexibility, diversity, adaptation, learning and reflexivity, and a politics of sustainability that highlights and supports alternative pathways.

While climate change mitigation and adaptation both matter, and are frequently inter-connected, this paper focuses on adaptation. Adger and Barnett (2009) argue that while the task of thinking about (and therefore framing) adaptation is unexpectedly urgent, it is also unexpectedly hard. This is partly because of the speed of potential change required, partly because of the uncertainties and complexities involved, and partly because of the very significant cognitive, social and institutional barriers that confront successful adaptation (Hamilton & Kasser, 2009; Adger *et al.*, 2010).

In this paper I offer a positioned reflection on a climate change adaptation initiative that sought to develop a transdisciplinary approach to co-researching good adaptation practices in the South African water resources sector. The institutional setting for this initiative was a research project hosted by the University of KwaZulu Natal (UKZN) and funded by the South African Water Research Commission (WRC). The paper explores the contribution of

individual skilfulness in reflexive and adaptive practice as well as the difficulties to developing effective transdisciplinary practice that were encountered as a result of politics, personal interests, misunderstanding, miscommunication and structural constraints and limits, including institutionalised ways of working.

2. Methodology: Laying the Path while Walking: Rigour, Chance, Luck and Serendipity

A key organising metaphor for the methodological approach taken in this paper is that of 'inquiry pathway'. Here I follow Churchman (1971) who speaks of inquiry as: 'reflective learning in the literal sense: it is the thinking about thinking, doubting about doubting, learning about learning, and (hopefully) knowing about knowing' (p.17). He defined 'inquiry' as an activity which produces knowledge (p.8); put in another way, inquiry facilitates a particular way of knowing which, when enacted, makes a difference. Thus an inquiry pathway is not something pre-existing to be discovered, but something that is laid down in the doing, where the challenge is to be as reflexively rigorous as possible in execution (Oliver, 2005).

Reason and Bradbury (2008) draw a distinction between first, second and third person inquiry. First-person inquiry is a reflexive process undertaken at a personal and individual level, although this may also involve the support of others. By contrast, second-person inquiry is a collaborative inquiry process within a face-to-face setting, while third-person inquiry includes a range of practices which draw together the views of larger groups of people and create a wider community of inquiry involving persons who cannot be known to each other face-to-face. The approach taken in this paper is an example of a first-person inquiry.

As first person action research, the framing of the four inquiry cycles reported in this paper is personal to the author. With the transition between these

cycles based on critical incidents[3] experienced during the unfolding of the research process, which in turn prompted critical reflection accompanied by reframing and planning for the next cycle.

There are, as with all methods, traps when narrating first person inquiries, each of which I have sought to be mindful of. These include the risk of telling stories where the author behaves in idealised ways (Snowden, 2001). Another trap is that of the heroic victory narrative where a myth arises around one person in the account, thus excluding the possibility for any non-hero to do anything similar (Gearty, 2008). A third trap is what Snowden has called retrospective coherence when a story is told where all actions seem to have been mindfully taken in the service of achieving a carefully designed process towards a desirable end. When this happens, chance, luck and serendipity are not acknowledged and everything reverts to the logical view of change as a sequence of well-planned and controllable steps (Snowden, 2004, in Gearty, 2008:86). That rarely corresponds with the messiness of human endeavour.

The narrative structure of this paper has also been designed in a non-linear way. That is, the paper only partially follows a traditional, linear narrative form of problem framing, method, results, discussion and conclusions. Rather, the story is as much one in which multiple layers of theory, experience and reflection are progressively unfolded.

2.1 Start Conditions, Including Key Assumptions Informing the Consortium Approach to the Research at the Outset

In 2009 the WRC put out a call for a solicited project which would "develop a framework that reflects an integrative adaptive management approach for facilitation of strategies for taking account of vulnerabilities and impacts of climate change in relation to water planning and management". The call included a number of specific objectives and deliverables that were reflected

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3 Following Flanagan (1954) I understand critical incidents as something 'that makes a significant contribution - either positively or negatively - to an activity or phenomenon'.

in the successful proposal of the UKZN-led consortium, of which I was a member. The project, referred to by the code K5-1965, started in October 2010 and was completed in March 2014.

The 'start conditions' of any initiative help to shape the pathways that it pursues (Ison *et al.*, 2011). In addition to the details of the call, start conditions commonly include the history, experience and research traditions of consortium members as well as those of key stakeholders. For me, the following are key assumptions which I brought to this project at its outset, and which were explored at the first project team workshop in October 2010:

(1) Based on my experience of working with a previous WRC project K5/1843 (Colvin and Stuart-Hill, 2011), investment in social learning processes (e.g. Collins *et al.*, 2008) within the project would enable the progressive development of good interdisciplinary learning and research;

(2) Based on my experience of leading a previous programme of research on integrative and adaptive water governance in South Africa (summarised in Colvin *et al.*, 2014a), a transdisciplinary research approach (Box 1) would provide the most effective way of building stakeholder understanding and ownership of water related climate change adaptation options, including integrated and adaptive management approaches, provided that key stakeholders could be effectively engaged in the process;

Box 1 Transdisciplinarity *Source*: Swilling (2012)

Lang *et al.* (2012) define transdisciplinarity as follows:

> Transdisciplinarity is a reflexive, integrative, method-driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge.[4]

Transdisciplinarity has emerged as a new mode of knowledge co-production with – rather than for - society in order to deal with complex societal problems that can no longer be approached and solved by mono-disciplinary approaches only.

These problems [which include climate change adaptation and linked issues of poverty alleviation and natural resource restoration] are complex because they are truly planetary-level problems, existing simultaneously at the global and local scales. But they are also complex because they are being produced by both nature and society, and therefore also have far-reaching long-term consequences for both nature and society. These are 'entangled' or 'hybrid' problems that can no longer be approached in terms of the two-world theory and disciplinary divide of separating the 'natural' from the 'social' as supposedly two fundamentally different and unconnected realities that can only be worked on separately by the natural and social sciences in isolation of society. Attempts to work within this double disciplinary and science vs. society divide can only result in the single disciplines producing partial knowledge of these hybrid problems; whereas the need today is clearly for integrated solutions based on integrated knowledge (Morin, 1999).

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4 Adapted from Bergmann, 2011.

(3) Developing effective transdisciplinary research practice within the research consortium would require additional investment in social learning (Box 2);

(4) To achieve its inter- and trans-disciplinary aims the consortium would need to take an adaptive management approach to project management. This would enable the research process to be adjusted and adapted in the context of a complex and uncertain stakeholder environment, as well as 'walking the talk' of the subject matter;

(5) That sufficient trust and joint understanding had already been established within the team to support the above approaches and to surmount challenges encountered

(6) That UKZN would support the above approach to the research process, including through flexible allocation of funding across the consortium as required.

Box 2 Design principles for transdisciplinary research (*Source*: Lang *et al.*, 2012).

These authors develop an ideal–typical model of the transdisciplinary research process conceptualized as a sequence of three phases. Though the model might indicate a rather linear process, they argue that the individual phases and the overall sequence often have to be performed in an iterative or recursive cycle, also highlighting the need for reflectivity in transdisciplinarity (see, e.g., Spangenberg, 2011). The model includes design principles associated with each phase and three general cross-cutting design principles (see below). While not explicitly referring to social learning, the three cross-cutting design principles are key elements of effective social learning practice.

Phase A: Collaborative problem framing and building a collaborative research team

- Build a collaborative research team
- Create joint understanding and definition of the sustainability problem to be addressed
- Collaboratively define the boundary / research object, research objectives as well as specific research questions, and success criteria
- Design a methodological framework for collaborative knowledge production and integration

Phase B: Co-producing solution-oriented knowledge through collaborative research

- Assign and support appropriate roles for practitioners and researchers
- Apply and adjust integrative research methods and trans-disciplinary settings for knowledge generation and integration

Phase C: (Re)-integrating and applying the produced knowledge in both scientific and societal

- Realize two-dimensional integration
- Generate targeted products for both parties
- Evaluate scientific and societal impact

General Design Principles

- Facilitate continuous formative evaluation
- Mitigate conflict constellations
- Enhance capabilities for and interest in participation

3. The Four Learning Cycles

3.1 First Learning Cycle (October 2010 – July 2011): Collaborative Problem Framing and Building a Collaborative Research Team

During the first year of the project the team invested considerable time and effort in interdisciplinary sense making and transdisciplinary design. This involved working towards shared understanding and agreement, firstly on the nature of the project's six work packages and their potential interactions (*interdisciplinary* understanding and practice), and secondly on how the research process could be designed in such a way that it was of practical value both to the primary intended beneficiary, the Department of Water Affairs (DWA) and potentially also to other stakeholders (*transdisciplinary* understanding and practice).

Two team social learning workshops were held to support this process: the first at the outset of the project in October 2010 and a second in June 2011. A significant outcome of the first workshop, in which team members met for the first time, was agreement to adopt a 'non-traditional', transdisciplinary approach to the research process. Rather than first undertaking the research and then engaging with stakeholders through workshops and training, consistent with a traditional, linear or 'mode 1' model of knowledge production[5], it was agreed that the research would be progressed in an iterative fashion, through ongoing engagement with a core group of stakeholders, primarily in the DWA. This latter approach requires and builds transdisciplinary, 'mode 2' knowledge co-production practices[6]. This was a significant agreement, as it implied a re-shaping of the design of the entire 3-year project.

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5 Mode 1 knowledge concerns the production of knowledge based on reification of an external, observed reality - sometimes also referred to as 'reliable knowledge' (Nowotny, 2003).

6 Mode 2 'knowing' is knowledge that is co-produced through a relational process of dialogue between stakeholders – sometimes also referred to as 'socially robust knowledge' (see Gibbons et al., 1994; RELU, 2007; Ison et al., 2011).

Building on this, by mid-July 2011 the project team had agreed a list of stakeholders (primarily, senior members of staff at the DWA) to be invited to form a 'core group' at a policy workshop in early September and had developed a detailed design for the workshop.

In summary, during this first learning cycle my experience was that the project team developed shared enthusiasm and commitment to a transdisciplinary approach. Social learning among team members helped them begin to understand what such an approach might mean in practice, as reflected in the plans and preparations for the first stakeholder workshop, while conceptually, the approach was represented and refined in a series of systemic diagrams. The culture of the team during this period was collaborative and the project at this point showed considerable promise.

One potential constraint that had emerged by the end of the first learning cycle was related to the way in which the research team had grown. While at the outset the team consisted of four senior staff and four PhD students, by July 2011 the number of early career researchers on the team had grown through the addition of two MSc students. This introduced a potential structural tension within the project team, between the focus of senior team members on inter and trans-disciplinary working, and that of the six PhD and MSc students who were required to pursue more independent research.

3.2 Second Learning Cycle (August 2011 – January 2012): Setbacks in Developing a Transdisciplinary Approach

In late July 2011 the project experienced a significant setback. A conversation with Dr Mgqubu, the Director of Climate Change at the DWA and the project beneficiary's main point of contact, revealed that she was putting out to tender a project which had a great many overlaps with K5-1965. In her view, this meant there was no point in any further engagement between K5-1965 and DWA or with stakeholders, until bids had been submitted (deadline late August 2011) and a successful public service provider (PSP) appointed.

This conversation revealed a series of disconnects:

- despite a careful consultation process managed by the WRC in the agreement with the DWA of the 2009 call for climate change/water sector projects, Dr Mgqubu was not aware of the positioning of this project to directly support the work of her team;

- despite communications both from the WRC and from the project manager since the start of the project, highlighting the direct relevance of this project to the DWA climate change team, and inviting Dr Mgqubu to participate in the project as a member of the reference group, Dr Mgqubu had not made the connection between the focus of this project and her immediate needs;

- there had been a failure by three other senior members of DWA, who had attended the first reference group meeting (which Dr Mgqubu had been unable to attend), to communicate the relevance of the K5-1965 project with Dr Mgqubu.

Despite previous familiarity on the part of many of us with these kinds of disconnects within the DWA, project team members were significantly 'thrown' by this development as it (i) highlighted our own failure to ensure this key element of stakeholding in the project at a sufficiently early stage and (ii) had significant implications in terms of a re-think of the project focus and approach. Mirroring the wider landscape of climate shocks and stresses, this development thus called for the project itself to 'walk the talk' of adaptation and for me marked the ending of the first and the start of the second cycle of project learning, requiring at least a 'double loop' reframing (Argyris and Schön, 1978).

I subsequently developed a bid in response to Dr Mgqubu's July 2011 call for proposals. While this was submitted in late August, no decision was taken on a preferred provider until the end of January (5 months later). The bid was unsuccessful and no feedback was given on the quality of the bid. During the waiting period the team therefore moved into a period of uncertainty, during which it decided to plan for both positive and negative outcomes to the bid

process. The latter generated a series of options, including those where the DWA remained as the primary stakeholder focus; those where the stakeholder focus was broadened to a partnership that included the DWA; and those that took a more systemic focus. In summary, this second learning cycle, in strong contrast to the first, was characterized primarily by independent activities within the project team. The bid development process that I led essentially involved the development of a new and considerably expanded team. Overall, my experience was that the initial rejection by Dr Mgqubu in July 2011 followed by a further 5 months' uncertainty while waiting for the outcome of the bid, effectively disrupted the collaborative focus on trans-disciplinary research within the K5-1965 project, such that team members reverted by default to more individualized research practices.

3.3 Third Learning Cycle (February- September 2012): Further Barriers to the Development of a Transdisciplinary Research Approach

The failure of the bid to the DWA in late January 2012 constituted a further blow to the project and its original aim to build an inter- and trans-disciplinary ethos. It led to the unintended consequence of further institutionalizing individualized research practices. At the same time the project came under pressure from the WRC to 'deliver stakeholder workshops'[7]. Despite an original focus on the national Water for Growth and Development strategy it was therefore agreed with the WRC that, given the difficulties experienced in engaging with the national DWA office, the project should seek engagement through workshops at a provincial level or more locally. In this context, it was agreed that I should develop a proposal for an engagement process in the Eastern Cape, reflecting a combination of options previously discussed. However, at the third team meeting in September 2012, this proposal was rejected on the grounds that the programme budget was insufficient to support it.

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7 Early on in the project, the WRC had requested that 1/6th of the budget was set aside specifically for the purpose of supporting 'stakeholder workshops'.

Rather than pursue the proposal against a background of funding uncertainty, the proposal was therefore put on hold.

In summary, this third learning cycle was for me characterized by ongoing flexibility and reorganizing by members of the project team, as a response to the difficulties encountered in engaging with the national DWA office. However, this willingness and ability to mobilize a creative response was not matched by the level of financial flexibility within the project, which therefore emerged as a significant barrier to effective adaptation of my own contribution to the project during the third learning cycle. This financial inflexibility was apparently a reflection of both WRC and UKZN rules and conditions.

3.4 Fourth Learning Cycle (October 2012 – December 2013): Reframing to an Interdisciplinary Research Approach

Two developments which closely following this critical incident opened up new opportunities to reframe what for me would become the fourth and final learning cycle of the project. Firstly, Professor Coleen Vogel, who had taken leave of absence from the project over the previous 18 months for health reasons, rejoined the project in August 2012 and conversations between the two of us rekindled a spark that had been ignited at the first project team workshop in October 2010, reflecting our shared interest in post-normal science. Searching again for a double loop reframing of focus for the final phase of the project, together we set out a proposal focusing on the (partially) collaborative development of the project 'handbook'. Agreement on the handbook approach was finalized with the project manager in late May 2013 and the handbook in both long and short versions completed in December 2013, as a collaboration between myself, Professor Vogel and her Honours student (Colvin *et al.*, 2014b, c).

Secondly, I began to observe growing interest and experimentation in transdisciplinary research for sustainable development in South African universities, principally at the Universities of Cape Town, Rhodes, Stellenbosch and Wits. A meeting with Professor Mark Swilling (University of Stellenbosch)

in October 2012 highlighted to me the range of pioneering approaches to transdisciplinarity being developed in a specifically South African context (Swilling, 2012; Lang *et al.*, 2012).

These developments helped to frame and shape the development of the K5-1965 handbook as well as this paper. Interestingly, for me the development of the handbook reflected a move away from transdisciplinary engagement but with a commitment to ground it in interdisciplinary dialogue. The dialogue, consisting of three face-to-face meetings between the co-authors and a full team workshop during the core writing period, were pivotal to the shaping of the handbook narrative structure as well as its core focus on a (hypothetical) community of systemic intermediaries, innovation brokers and bridging organisations (Colvin *et al.*, 2014b, c).

4. Reflections, Discussion and Learning

In reflecting on the experience of participating in this 3.5-year project I look at a number of different levels, using a series of different lenses. Firstly, and in the spirit of first person inquiry, I draw out some of my personal learning through the course of the 3-year project. Secondly, given the focus of the project on integration, I reflect on some of the factors which enabled and constrained effective transdisciplinary practice as the project unfolded, using the lens of Lang *et al.* (2012). Thirdly, given the focus of the project on adaptation, I reflect on the factors that enabled and constrained the adaptive capacity of the project team, using the lens of Marshall *et al.* (2012), together with an emergence lens. And finally, I allude tentatively to some of the broader lessons that might be drawn for the role of the university sector in South Africa, as it seeks to adapt and potentially transform its role as a key facilitator of society's wider adaptive response to climate change and that of the water sector in particular.

4.1 Personal Learning

O'Brien (2013) argues for the value of adaptation from the 'inside-out' as a complementary approach to thinking about and doing adaptation in the world, highlighting the value of reflecting on the perspectives we bring to adaptation research and practice, including our own blind spots. More strongly, she proposes that adaptation from the inside-out can be seen as "a critical part of any adaptation process, for it enables us to deal with complexity, uncertainty and surprises" (O'Brien, 213: 313). Indeed, from a social learning perspective, it would be surprising if we were to ignore our own reflexive practice as researchers, while urging social learning on others. This in turn connects to an action research perspective in which linkages between first, second and third person inquiry are highlighted within an integral practice (e.g. Torbert and Taylor, 2008).

So, turning to my own feelings at the conclusion of this project I notice a mixture of disappointment, surprise and satisfaction. Disappointment that as a consortium team we were not afforded the opportunity to collaborate with the DWA in a transdisciplinary inquiry into the meaning and practices of climate change adaptation in the context of water resources reform. As a result, we seemingly lost the momentum and motivation to attempt another transdisciplinary inquiry, perhaps focused in a different stakeholder setting and/or more locally. Or perhaps (see 4.4 below) the structural dynamics of the consortium team were such that the pull to more individualized practices (in the context of masters and PhD projects) proved stronger.

4.2 Synthesis of Five Years of Personal Inquiry

My feelings of surprise perhaps point to the main areas of my personal learning and development. I am surprised by the nature of collaborative work around the development of the handbook that emerged during the fourth cycle of learning and in which I participated. I couldn't have anticipated this at the outset of the project. I have found the writing of the handbook to be not only an intellectually rewarding endeavour but also one that has provided

a space that is rare for me in the consulting world, that is, the opportunity with others to think through and develop a linked set of ideas – a thesis - without the constant need to work with and respond to clients' or partners' thinking and practice. In other words, while transdisciplinary practice is my daily bread and butter (although the research side is often weak), for me, 'mode 1' professorial research and analysis is a rare luxury. This project has provided the space for me to undertake a sustained piece of analysis in a complex field that invites repeated examination and reframing. Indeed, I notice that I became involved in this project (late 2009) at precisely the time that it was becoming clear to me that the rapidly emerging challenges of climate change adaptation would demand new levels of intellectual insight and discipline within my professional practice. So in a way, writing the handbook has enabled me to synthesise a five year first person inquiry which has sought to make sense of climate change adaptation in the water resources sector.

4.3 Deepening Understanding of Emergent Processes

So – where does the personal development lie? Of course, personal development is a holistic process and doesn't take place within the compartments of different research and consulting projects but rather, across these as well as within one's personal life. In this respect, my sister's progressive struggle to live with cancer during the final two years of the project affected me profoundly. Nonetheless, it is possible to point to some of the ways in which this project has shaped my professional practice on a personal level. Firstly, it has deepened my understanding of emergence (Collins and Ison, 2009) and how I work with emergent processes. This is an area where I consider that I already have considerable mastery, so I am struck by how much the reframing of my research focus through the life of the project from trans- to interdisciplinary (as discussed above) took me by surprise. Undoubtedly, being a team member rather than the team coordinator on this project further reinforced the need for me at various stages of the project to let go both of expectations and assumptions and instead to notice what was emerging and within this, what actions were possible, or at least, 'good bets' worth pursuing.

Secondly, the process of working on the handbook has contributed in a very practical way to building my confidence and experience in the art of interdisciplinary writing. Here, I have again found myself working with an iterative and emergent process. The 'holding' relationship involving my colleagues has contributed to an inquiry-based exploration of the 'form' of the handbook which has been critical to the sense-making (i.e. 'content') of the whole. This enabled me to guard against the ways in which this can so easily be overtaken, discounted and devalued by conventionalized academic approaches to forming (see Marshall, 2008, for further reflections on finding form in writing for action research).

4.4 Reflections on Integrative Research Practice within the Project

Moving from reflections on my personal learning to reflection on some of the factors which enabled and constrained integrative research practice within the project, in this section I draw on the lens of Lang *et al.* (2012) introduced in Box 2, to further reflect on the arc of trans- and inter-disciplinary practice development narrated within section 3.

Reflection on the design principles relevant to the first phase of the Lang *et al.* (2012) model (problem framing and team building), suggests that during the first learning cycle, there was good investment in three of the four relevant design principles, namely (a) the development of collaborative capacity within the team, (c) work to develop joint understanding of the boundary research object and questions, and (d) the emergent design of a methodological framework for collaborative knowledge production and integration. However, in the absence of effective engagement with the DWA during this phase, it was not possible to apply design principle (b), that is, the development of joint understanding and definition of the issue to be addressed.

Enabling factors during this phase included the investment in two social learning workshops and a strong mix of relevant expertise, experience and other relevant "stakes" needed to tackle the adaptation issue in a way that could both provide solution options and contribute to relevant areas of scientific

discourse. This included expertise and experience relevant to each of the aims of the project – a relatively unique constellation in the South African context. As previously noted, a potentially constraining factor also emerged during this first phase –the structural tension within the project team between the four senior staff, with commitments to interdisciplinary collaboration, and the requirements for the four PhD/MSc team members to pursue more independent research. The project manager occupied a unique position in this respect, with commitments both to project integration and coordination and to the independent pursuit of her PhD.

However, following the first learning cycle, first the transdisciplinary and then the interdisciplinary praxis of the project progressively weakened. With regards to the former, despite two attempts at engaging with Dr Mgqubu at the national DWA office, it did not prove possible to apply design principle (b), that is, the development of joint understanding and definition of the issue to be addressed. From my perspective, a third attempt to initiate a transdisciplinary research process, this time in the Eastern Cape, was also unsuccessful, but for different reasons, in this instance reflecting the inflexibility of financial arrangements within the project and the lack of an effective mechanism to address this in a timely fashion.

Interdisciplinary praxis within the project also weakened, with the fifth interim report to the WRC, covering the reporting period March – September 2012, consisting primarily of independent chapters from different team members, and with a coordinating narrative from the project manager, but with little sense of proper inter-disciplinary development. This partly represents the reality of a project seeking to recover from a series of shocks and coping as best it can, and partly the reality of the PhD/MSc grouping within the project team, which was never designed to develop interdisciplinary practice. Indeed from the perspective of 'delivery' to the WRC, the relative independence of the PhD/MSc research streams can be seen as a good thing, giving the project potentially greater overall resilience than if it had been fully invested in inter and transdisciplinary praxis. Thus, while sacrificing the strength of integrative narratives arising from effective inter- and trans-disciplinary

collaboration across the whole consortium, the project instead generated a series of outputs which offer us a diversity of perspectives on integration, as demonstrated for example in the various chapters of the final report to the WRC as well as within the handbook.

4.5 Reflections on Adaptive Research Practice within the Project

In the context of its commitment to 'walk the talk' of adaptive management, the project team found itself facing a series of challenges to adapt to unfolding dynamics throughout the project, as narrated in section 3. Here I reflect on the characteristics of adaptive management as practiced by the team overall. Adaptive management, expressed as 'facilitating continuous formative evaluation', is highlighted as a general design principle in the transdisciplinary research model of Lang *et al.* (2012), while Marshall *et al.* (2012), in their analysis of factors that enable or constrain adaptive capacity, highlight the importance of the following:

(i)   how risks and uncertainty are managed;

(ii) the extent of skills in planning, learning and reorganizing;

(iii) the level of financial and psychological flexibility to undertake change; and

(iv) the anticipation of the need and willingness to contemplate and undertake change.

As I reflect on the nature of the adaptive management within the project, I notice first that it was one of my core assumptions that the team would need to take a reflexive adaptive management approach, not only in order to 'walk its talk', but also in order to achieve its inter and transdisciplinary aims (assumption #4 in section 2). However my main experience of adaptive management practice within the project was that, despite initial good intentions, the overall reality was one of adaption through self-organisation rather than through shared reflexive practice. This is not necessarily a bad thing,

as the project was still able to meet many of its aims and indeed, as argued above, may have been more resilient as the result of an emergent process of self-organisation rather through a more integrated and reflexively adaptive approach.

The team had within it many of the skills listed by Marshall *et al.* (2012) above. However, as with the development of inter and transdisciplinary practice, several factors appeared to constrain the development of shared adaptive practice within the team. Perhaps the main constraint was that for the PhD and MSc students involved, there was no specific requirement for the practice of adaptive management within their projects. On the other hand, there was considerable freedom for those, such as myself, who wished and needed to practice adaptive management, to do so. And given the early crises that undermined motivation and commitment to undertake inter and transdisciplinary research within the project, the effective need to undertake shared adaptive management also progressively weakened.

4.6 Reflections on the Potential for Transformation towards Transdisciplinary Praxis within the South African University Sector

There is already considerable investment in the South African university sector as a vehicle for societal transformation. For example, the Department of Science and Technology's Global Change, Society and Sustainability Research Programme signals a commitment to investing in knowledge challenges which are highly relevant to climate change adaptation in the context of the water resources sector; these include 'Adapting the way we live' and 'Innovation for sustainability'[8].

Reflecting this focus on societal transformation, a commitment to transdisciplinary research is emerging within several South African universities, including Cape Town, Rhodes, Stellenbosch and Wits, who are demonstrating an increasingly proactive leadership role to the sustainable development

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8 http://www.globalchange.grandchallengeonline.org/

of South Africa and the wider region. This commitment is further mirrored in the climate compatible development initiative of the Southern African Regional Universities Association (SARUA) network (Urquhart and Lotz-Sisitka, 2014).

At the same time, a transition of research praxis toward transdisciplinary sustainability research has very significant implications for current institutional architecture within the South African university system. As encountered in this project, transdisciplinary science requires new research methods, a suitable training of junior scientists, and specific career pathways beyond disciplinary boundaries—to name only some aspects of science system capacity building. Most of these measures can only be delivered by universities. The fact that the institutional setting of universities has historically developed in the context of disciplinary and mode-1-research-structures presents a significant problem for the further development of a knowledge system suitable to the challenges of a sustainable development (Stephens and Graham, 2010).

5. Conclusions and recommendations

This paper has highlighted some of the structural difficulties involved in taking the transdisciplinary research turn, specifically in the context of a research project focusing on climate change adaptation within the South African water resources sector and embedded within the South African university system. Some of these structural difficulties were shown to lie outside the university system, reflecting disconnects within the national DWA office and attendant difficulties in engaging effectively in a genuinely transdisciplinary opportunity for knowledge co-production and capacity building. Yet within our consortium, and reflecting wider patterns within the South African university system, perhaps the most significant limit encountered was that of the current context of disciplinary and mode 1 accreditation structures, preventing early career scientists from training and experiential learning in inter- and trans-disciplinary research practices. Accounts of addressing these limitations

within universities of the global North tend to focus on the postdoc stage of development (Barlow *et al.*, 2011), although a recent account of building career pathways which include transdisciplinary research practices, from a community of Australian researchers, also involved PhD students (Patterson *et al.*, 2013). Set against this, valuable insights are now emerging into how transitions towards transdisciplinary institutional practices are emerging in other countries, for example within the German science system (Schneidewind and Augenstein, 2012). While it is beyond the scope of this paper to address how these limits might be addressed in the South African context, it is surely critical for the WRC to take these into account in commissioning future research/projects that might require an action research, interdisciplinary or transdisciplinary focus.

In the face of the structural constraints and limits described above, a broader set of reflections can also be drawn out about the value of reflexive hybrid practice and institutional entrepreneurship in the context of climate change adaptation. While politics, personal interests, misunderstanding, miscommunication and structural constraints and limits all conspired to undermine the transdisciplinary research approach initially intended, a mix of committed reflexive practice and serendipity also enabled the author, working with fellow researchers, to turn failure into opportunity and to produce a valuable handbook out of the research process.

My personal experience within this project also suggests that co-designing and leading effective adaptation initiatives vitally depends on having the courage to think differently, the ability to translate that thinking into action, and being prepared to change course if that is what is required. I am aware that there are many others who like myself are seeking to work with disruptive processes of social innovation in a range of settings, whether within civil society, within organizations or in settings that bridge multiple organizations (Westley *et al.*, 2013). Such individuals will be familiar to those who read and publish in this journal, as they include a wide variety of individuals, whether managers or activists, scientists or policy makers, consultants or social entrepreneurs, "who dare to walk on the two legs of academic knowledge and practical experience"

(van der Zouwen, 2011). I hope therefore that in sharing the above account, I will have succeeded in critically engaging with fellow reflective hybrids who are drawn to play a role in transformational practice at this enormously rich as well as challenging moment in our planetary evolution.

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