Complex Contradictions as Drivers of Expansive Learning in Water Resources Co-management in the uMzimvubu Catchment

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Abstract

The aim of this article is to understand complex contradictions which are involved in collaborative management of water resources at a catchment level in South Africa, where numerous water challenges exist including security of supply, degradation of ecological infrastructure, poor landscape governance and resource pollution. To address water related challenges, South Africa has defined several Strategic Water Source Areas (SWSAs), one of which is the uMzimvubu catchment in the Eastern Cape. The uMzimvubu catchment is located in the former Transkei homeland, and the river system runs along the northern border of the Eastern Cape Province.

The study draws on Cultural History Activity Theory (CHAT) and it analyses contradictions within and between activity systems in the uMzimvubu catchment. In this theory, contradictions are the source of expansive learning; they are the focus of co-engagement to resolve identified contradictions using formative intervention methodology. Change Laboratories (or Change Labs) were used in this study as hubs for learning and the methodological approach was informed by the expansive learning cycle. In the uMzimvubu catchment, co-management of water resources is characterised by complex contradictions and these stem from deep-seated structural dynamics where historical, cultural, political, ecological and social aspects intersect.

Keywords: *co-management; activity systems; contradictions; expansive learning; isiphithiphithi*

Background of water security in South Africa and in the uMzimvubu catchment

South Africa is one of the 40 driest countries in the world with an annual average rainfall of 497 mm. In essence, South Africa is a water-scarce country that strives to provide safe drinking water (Meissner et al., 2018). According to Calverley and Walther (2022), the history of water access in South Africa is a mirror of its political history, including racial and economic divisions. To address these water related challenges, South Africa has defined several Strategic Water Source Areas (SWSAs) as areas that contribute disproportionately

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great volumes of mean annual runoff to an area of importance (Net et al., 2013). They occupy 10% of South Africa and provide 50.4% of the river flows (Le Maitre et al., 2018). The SWSAs sustain water supply systems for over 50% of the population; however, only 18% of SWSAs are protected (Le Maitre et al., 2018).

Between July 2019 and November 2023, the South African government established the Living Catchments Project (LCP), as a means of including social innovation and transformative social learning practices into water resource management at catchment level (SANBI [South African National Biodiversity Institute], 2020). The aim of the LCP was to foster effective and collaborative catchment governance through the establishment of communities of practice (CoPs) (drawing on Wenger's (1998) interpretation of social learning) where diverse actors could work together in different groups to strengthen catchment management practices. The LCP was implemented in four catchments (see Figure 1) that are linked with strategic water source areas (SWSAs) for surface water across South Africa, namely, the uMzimvubu (Eastern Cape Drakensberg SWSA), Berg-Breede (Boland SWSA), Olifants (Mpumalanga Drakensberg SWSA) and the uThukela (Northern Drakensberg SWSA) (SANBI, 2023).

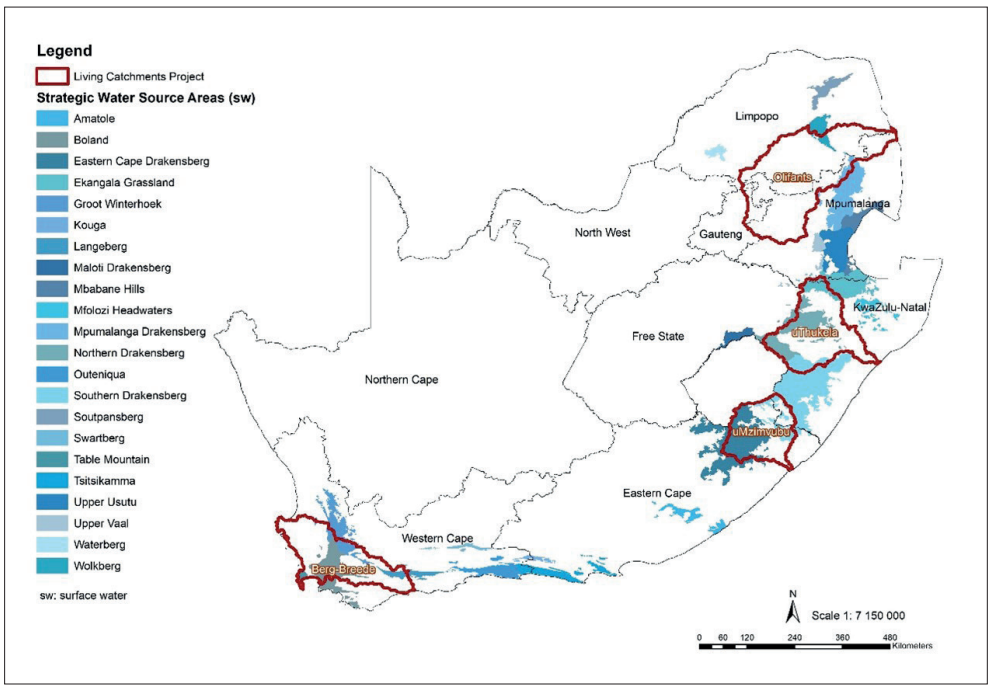


Figure 1: *Overview of the four catchments that were the project sites for the Living Catchments project SANBI, 2023)*

This study was based in the uMzimvubu catchment which is located in the former Transkei homeland. It is regarded as one of the least altered freshwater systems in the country, rich in biodiversity (with over 2 000 plant and animal species that are unique to the area), but there are contemporary difficulties of poverty and environmental deterioration in this area (Freshwater Health Index, 2022). Co-management in this study entailed the coming together of the different stakeholders involved in water resources management, to learn how to collectively manage water resources effectively in the uMzimvubu catchment. Co-management approaches were required to address the multifaceted challenges that are shaped by complex contradictions. Co-management approaches, by their very nature, require more than linear, traditional and exclusive approaches to water management. Such approaches need to be more engaged and socio-ecologically transformative (Eaton et al., 2021; Garmendia & Stagl, 2010; Reed et al., 2018).

Cultural-historical activity theory as a tool to assist in transformative co-learning for water management at a catchment level

Over the past two decades, researchers have drawn from Cultural-Historical Activity Theory (CHAT) as an alternative to predominant behavioural and cognitive theories of learning including in Southern African research contexts. CHAT was initiated in the 1920s and 1930s by Russian psychologists Vygotsky (1978) and Leont'ev (1978) and developed further by Engeström from 1978 to the present. CHAT analysis enables in-depth analysis of diverse activity systems, allowing different actors to work towards a shared object: in this case, the shared object of water resources co-management. CHAT offered a formative interventionist methodological approach for this study; it involved multiple actors working from within and between different activity systems, trying to learn how to work together to improve water security in the uMzimvubu catchment through co-management of water resources.

There are currently four generations of CHAT and they all possess unique characteristics (Table 1). The first generation, founded upon the work of Vygotsky, developed the idea of "mediation" (Engeström, 1987), and "culturally mediated action" was the prime unit of analysis (Sannino & Engeström, 2018). The development of the 2nd generation of CHAT is attributed to the work of Leont'ev that emphasised the shared nature of human activity, and to the work of Engeström (1987) that assisted with the development of the activity systems model (Yamagata-Lynch, 2010). The third generation of CHAT was expanded to encompass a minimum of two interacting activity systems. This third generation developed conceptual tools to facilitate the understanding of dialogue, diverse perspectives and voices, and activity systems interacting in networks (Engeström, 1987). The work of Sannino (2020), Sannino and Engeström (2017) and Engeström (2018) highlight that the emergent CHAT fourth generation focuses on "heterogenous work coalitions" which are directed towards the resolution of the "wicked" problems of society, also named "runaway objects", and the creation of sustainable alternatives to capitalism (Engeström & Sannino, 2020).

Table 1: *Four generations of CHAT and their unique characteristics. Source: Engeström & Sannino (2021)*

	First generation	Second generation	Third generation	Fourth generation
Object and problem	Challenge in individual learning or development	Collective developmental contradictions demanding an expansive solution	Developmental contradictions within and between interconnected activity systems	A critical societal challenge or crisis demanding a multi-level and cross-sectoral solution
Unit of analysis	Mediated action	Collective activity system	Minimally two interacting activity systems with a partially shared object	Coalescing cycles of expansive learning in a heterogenous coalition of activities facing a critical societal challenge
Concept of learning	Internalisation of given skills and knowledge	Expansive learning cycle generating what is not yet there	Expansive learning cycle involving boundary- crossing and horizontal sideways learning	Horizontal and vertical interplay between multiple coalescing cycles of expansive learning
Concept of agency	Agency as grasping the historically evolving nature and emancipatory possibilities of one's actions	Agency as expansive movement from individual subjects and their tasks towards collective subjects transforming their activity	Agency as recognition and negotiation of differences and complementarities	Transformative agency by double-stimulation
Typical intervention	Training aimed at emancipatory understanding and mastery of one's actions	Longitudinal process of collective analysis and redesign of the activity emergence of the Change Laboratory method	Change Laboratory and Boundary-Crossing Laboratory	Multiple interconnected Change Labs, from local to municipal, regional, national and international levels, with longitudinal follow-up and support

Third generation CHAT was identified as beneficial for this study because there were five identified interacting activity systems with a partially shared object, which was co-management of water resources in the uMzimvubu catchment. Surfacing the agency of the actors in these different activity systems was a key tenet in the study because co-managing the water resources in the catchment required boundary-crossing and developing solutions emerging from the diverse knowledge types in the various activity systems. Contradiction analysis (see below) played a role in spurring learning about co-managing water resources,

as there were contradictions within and between interconnected activity systems in the uMzimvubu catchment. The learning intervention occurred in the change laboratories (Change Labs) that were held in the uMzimvubu catchment and the expansive learning cycle informed the study's methodological approach.

Using the expansive learning cycle as a methodological approach in the Change Labs

Change Labs were used in this study as hubs of learning where boundary-crossing, discussion and framing of solutions for water-related issues in the uMzimvubu catchment occurred. Change Labs are used in formative interventions as spaces for learning and co-development of new solutions by practitioners using a variety of tools and instruments to address systemic issues and complex problems in given contexts. The methodology in the Change Labs was based on the seven learning actions of the expansive learning cycle (see Figure 2) (Engeström, 1999), which also included analysing the systemic contradictions that were associated with managing water resources in the uMzimvubu catchment. The expansive learning cycle occurred in the Change Labs, which were held in the uMzimvubu catchment from June 2021 to November 2021.

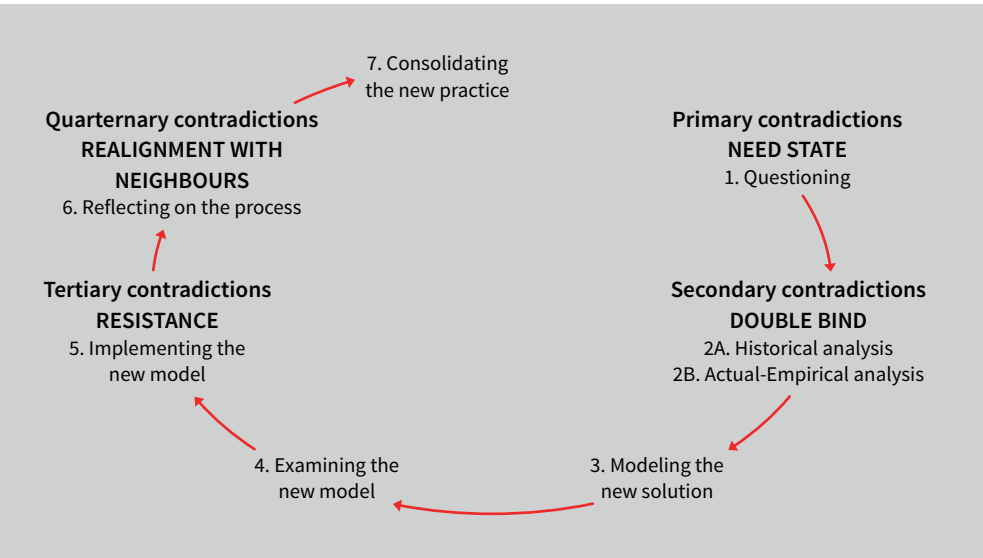


Figure 2: *Expansive Learning Cycle with seven learning actions (1-7) that guide the expansive learning process (Engeström, 1999)*

Boundary-crossing refers to the process of practitioners who endeavour to work in territories which are unfamiliar to them, by transitioning and interacting across different

sites, to formulate concepts collectively and find tools and information where they might be available (Engeström et al., 1995; Pesanayi, 2019). In this study, boundary-crossing involved the various actors from the five surfaced activity systems collectively learning how to co-manage water resources and developing new solutions for their catchment in the Change Labs. A contextual profiling trip (a research trip which assists in understanding the study context better and holistically), augmented by a desktop analysis and literature review, was instrumental in surfacing and analysing the contradictions in, and between, the five activity systems which were present in the study (see Figure 3). The Change Labs provided a platform to surface the existing learning present in the diverse activity systems regarding the shared object of water resources co-management. The five surfaced activity systems, along with their components, in the uMzimvubu catchment were as follows: community activity system, traditional leadership activity system, non-governmental (NGO) activity system, Living Catchments Project (LCP) activity system and local government activity system.

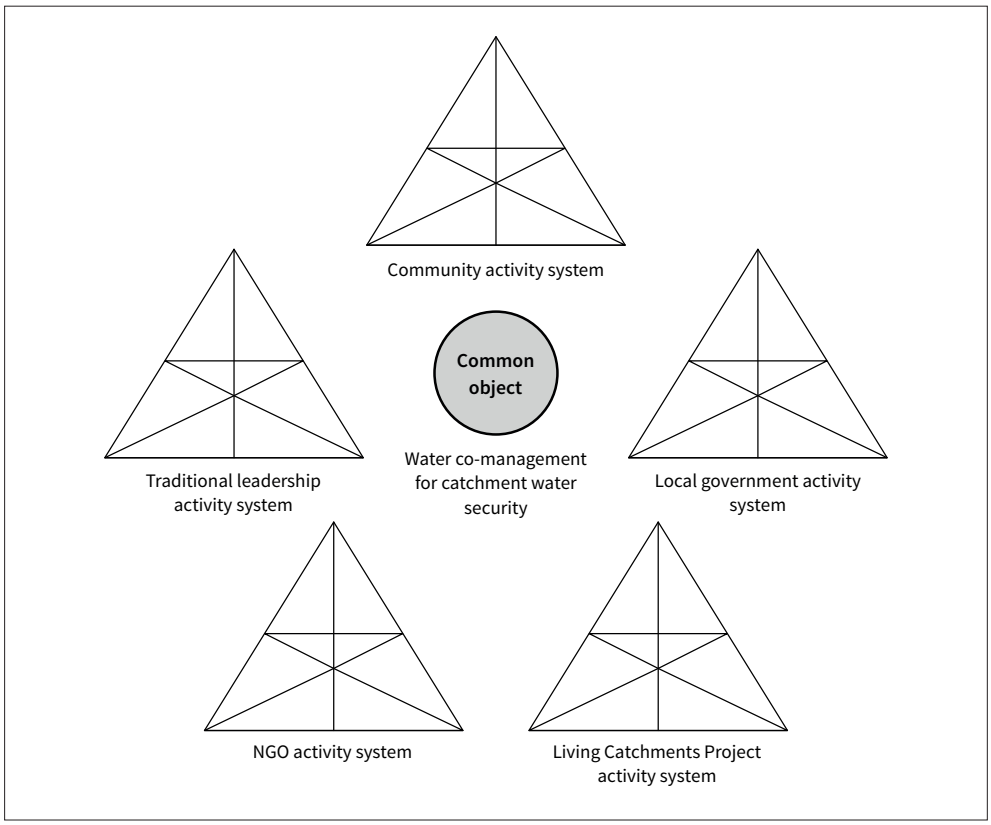


Figure 3: *Five activity systems with a potentially shared object in the uMzimvubu catchment*

Understanding contradictions and manifestations of contradictions in and between activity systems

An activity system consists of six core components: tools/instruments, subject, rules, community, division of labour and object. The ***subject*** can be described as the individual or sub-group whose position and point of view are selected as the perspective of the analysis (Engeström & Sannino, 2020). Yamagata-Lynch (2010) defined the ***object*** as the purpose of the activity, that is the goal or the motive of the represented activity. ***Tools*** (instruments and signs) are used for the purpose of turning the object into outcomes (Engeström & Sannino, 2020) and people engage with the world using cultural artefacts such as signs and tools (Sannino & Engeström, 2018). The ***community*** is defined as the "individuals and subgroups who share the same general objective" (Sannino & Engeström, 2020, p. 5). ***Rules*** are defined as the "explicit and implicit regulations, norms, conventions and standards that constrain actions within the activity system" (Sannino & Engeström, 2018, p. 45). ***Division of labour*** relates to the way in which tasks in the community are shared (Yamagata-Lynch, 2010) and refers to the "horizontal division of tasks and vertical division of power and status" (Engeström & Sannino, 2020, p. 5).

Contradictions emerge within and between activity systems (primary, secondary, tertiary and quaternary contradictions). Contradiction is a fundamental philosophical concept and contradictions are viewed as opportunities for new learning and change. According to Engeström (1987), four levels of contradictions can be identified in the investigation of human behaviour:

Level 1: Primary inner contradiction (double nature) within each constituent component of the central activity
Level 2: Secondary contradictions between the constituents of the central activity
Level 3: Tertiary contradiction between the object/motive of the dominant form of the central activity and the object/motive of a culturally more advanced form of the central activity
Level 4: Quaternary contradictions between the central activity and its neighbour activities (Engeström, 1987, pp. 103–104)

According to Gedera and Williams (2013), primary contradictions occur inside activity system elements (for example, within the community). Secondary contradictions occur between activity system elements (for example, between the community and the subject), tertiary contradictions occur when activity participants are required to use an advanced method to achieve an objective (for example, when they are introduced to a new technology) and quaternary contradictions occur between the central activity system and outside activity systems (Gedera & Williams, 2013). In their work, Engeström and Sannino (2011) discuss and highlight discursive manifestations of contradictions, namely dilemmas, conflicts, critical conflicts and double binds.

> **'Dilemmas'** are traditionally studied in social psychology as means for understanding processes of decision making, moral reasoning, social representations and ideologies. Dilemmas characterise our everyday thinking and conduct (Engeström & Sannino, 2011, p. 373).
>
> **'Conflicts'** take the form of resistance, disagreement, argument and criticism (Engeström & Sannino, 2012, p. 373) … "conflict occurs when an individual or a group feels negatively affected by another individual or group, for example because of a perceived divergence of interests, or because of another's incompatible behaviour" (De Dreu & Van de Vliert, 1997, p. 1).
>
> **'Critical conflicts'** are situations in which people face inner doubts that paralyse them in front of contradictory motives unsolvable by the subject alone (Engeström & Sannino, 2011, p. 374) … "a critical conflict is a situation of impossibility or unintelligibility" (Vasilyuk, 1988, p. 199).
>
> **'Double binds'** are processes in which actors repeatedly face pressing and equally unacceptable alternatives in their activity system, with seemingly no way out. Such repetitive processes tend to get aggravated, to the point of reaching crises with unpredictable and 'explosive' consequences. … A double bind is typically a situation which cannot be resolved by an individual alone (Engeström & Sannino, 2011, p. 374).

In addition, in this study, there were contradictions which emerged and manifested in various ways such as systemic inadequacies, system failures, paradoxes and disorders in the system. I could not find appropriate or adequate terminology in the literature to describe this phenomenon, and how some of the contradictions manifested. I thus coined the term *"isiphithiphithi"* – a fifth manifestation of some of the contradictions which surfaced in the study (Kuse, 2024). *Isiphithiphithi* is taken from the isiXhosa language (which is also the language spoken in the catchment and my home language). *Isiphithiphithi* refers to complexity and rapid disorder, which cannot be easily managed and manifests as a problem which is very difficult to solve. *Isiphithiphithi* also refers to confusion, disorder and intersecting and multi-layered conundrums which often occur because of certain actions of subjects in a particular activity system, or the level of complexity affecting the object of activity arising from a mix of concerns that are historical and contemporary as well as other factors related to resources or politics, governance patterns or ecological conditions.

Surfacing complex contradictions in the uMzimvubu catchment through the lens of multiple activity systems

In the context of this study, the contradictions that surfaced were historically and culturally rooted in the uMzimvubu catchment. Five contradictions related to water resources were surfaced. These contradictions occurred within activity systems and between activity systems. They were related to: a) ***freshwater springs,*** b) ***wattle invasion*** c) ***raw sewerage***

and stream pollution, d) ***water access***, and e) ***degradation of wetlands***. The uMzimvubu catchment is densely populated, with many ***springs*** serving as a source of potable water for remote settlements. ***Black wattle*** (*Acacia mearnsii*) is a fast-growing and aggressive invasive tree species with widespread negative impacts on water resources. Lack of service delivery by the local municipality and non-adherence to waste disposal regulations has contributed to widespread ***raw sewerage and stream pollution*** in the catchment. The uMzimvubu catchment is a SWSA; however, some people in the village settlements still struggle with everyday ***access to water***. ***Wetlands*** in the uMzimvubu catchment are important water sources for livelihood activities and livestock, especially during the dry and winter seasons, however they become ***degraded*** by grazing of livestock and unsanctioned issuing of lands by traditional leadership. The different contradictions and how they manifested in the catchment are illustrated in Figures 4-13 and are summarised below.

(a) Spring contradictions in uMzimvubu catchment *(see Figures 4 and 5)*

(i) Primary contradictions within the community activity system

Primary contradictions in the ***mediating artefacts*** of the community activity system surfaced through the issue of non-adherence to teachings about freshwater springs' health and environmental hygiene. Primary contradictions in the ***subjects*** of the community activity system surfaced through the exclusion and alienation of certain stakeholders in the management of natural and water resources. Primary contradictions in the ***rules*** of the community activity system surfaced through pollution and littering near the springs and washing of clothes near springs. Primary contradictions in the ***division of labour*** in the community activity system were reflected in the undesirable and unhealthy state of the springs in the catchment, because of the lack of maintenance, upkeeping and cleaning. Contradictions manifested as ***double binds, dilemmas, conflicts*** and ***critical conflicts***.

- **Double bind:** there is a disconnect between contemporary and traditional cultural teachings about spring hygiene.
- **Dilemma:** the villagers felt that their 'voice' (opinions and perspectives) on the matter of spring was not heard and taken into consideration by funders.
- **Critical conflict:** uncleanliness and unhygienic conditions around the springs and the non-adherence to the traditional rules relating to non-littering, livestock drinking policies and hygiene around springs is a source of conflict.
- **Conflict:** the younger generation disagreed with the older generation about how the labour should be divided regarding the cleaning and maintenance of the springs and this is reflected in the poor state of the health of the springs.

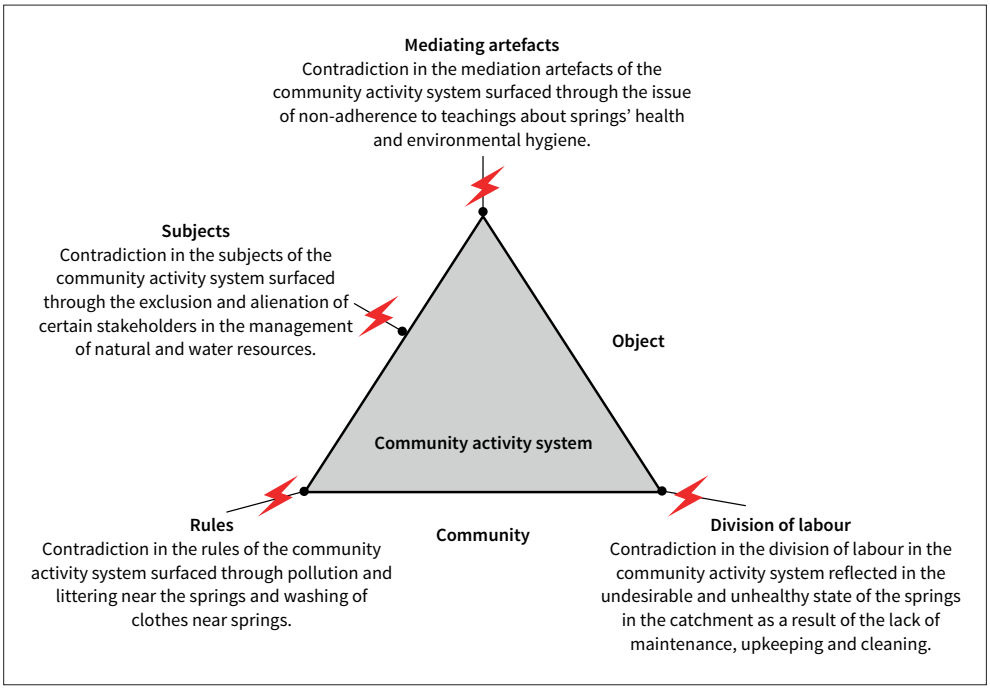


Figure 4: *Primary contradictions within the elements of the community activity system*

(ii) Tertiary contradictions between tools of the NGO activity system and rules of the community activity system; and Quaternary contradictions between the elements of the community activity system and the NGO activity system

Tertiary contradictions between the ***tools*** of the NGO activity system and the ***rules*** of the community activity system were reflected by the non-acceptance of methods of spring protection and damaging of equipment. Quaternary contradictions between the ***rules*** of the NGO activity system and the ***object*** of the community activity system were reflected by the lack of investment towards certain springs in the catchment. Quaternary contradictions between the ***object*** of the NGO activity system and the ***community*** element of the community activity system were reflected by preventing chemicals from being introduced in certain springs.

Contradictions manifested as ***dilemmas and conflicts.*** As an example of a dilemma, NGOs must abide by specific rules to operate and protect springs (funding agreements, government policies, organisational obligations, etc.). However, the NGO activity system was limited in carrying out its mandates to assist the communities in protecting their preferred springs, leading to fewer springs being protected and maintained. A conflict is evident in how the NGO activity system uses Western scientific methods (chemicals, biological agents, etc.) to purify, maintain and protect the springs. However, these methods

were in direct conflict with certain members of the community who do not see the springs as simply water sources, but for healing and spiritual importance. Some community members believe that adding western scientific biological agents to the springs is problematic for community traditions and culture.

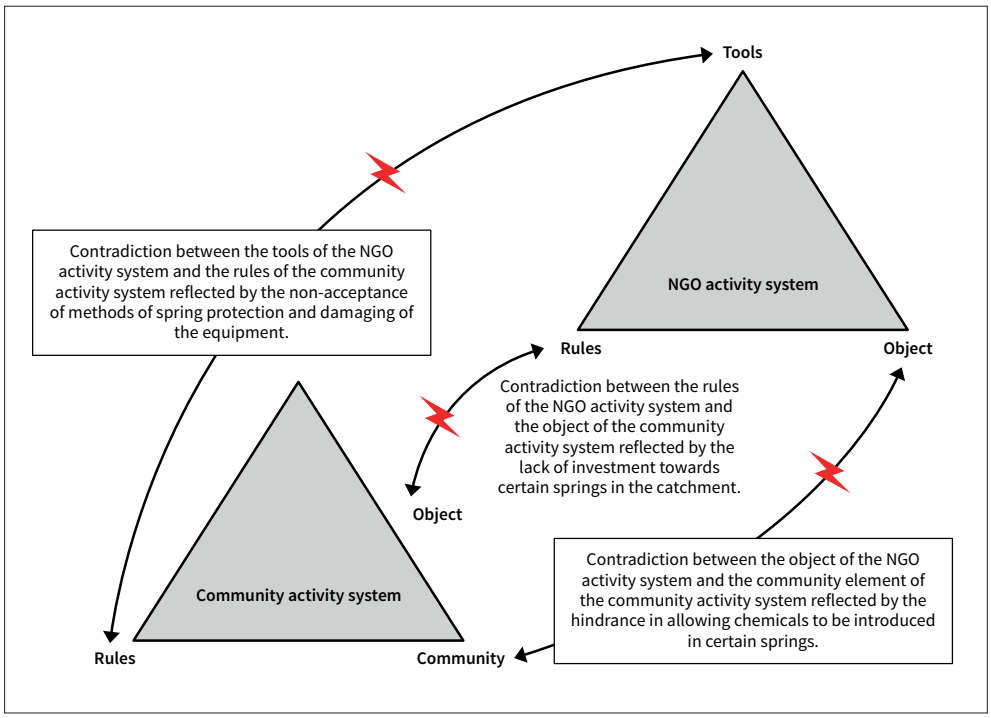


Figure 5: *Quaternary contradictions between the elements of the community activity system and the NGO activity system; tertiary contradictions between tools of the NGO activity system and rules of the community*

(b) Wattle contradictions in the uMzimvubu catchment *(Figures 6, 7 and 8)*

(i) Primary contradictions within the subjects of the community activity system and secondary contradiction between the subjects and object of the community activity system

Primary contradictions within the ***subject*** of the community activity system were reflected by the support for (and the continuous presence of) black wattle even though it threatens water and resources in the catchment. Secondary contradictions in the ***subject*** and ***object*** of the community activity system were reflected by the continuous use of wattle, even though this jeopardises water security of the villages. **Contradictions** are manifested as ***dilemmas*** and ***critical conflicts***. In terms of **dilemma**, black wattle is used for different purposes in

the villages and people buy it from vendors; black wattle threatens water availability in the catchment, but some people need it to support their livelihoods. In terms of **critical conflict**, the subjects found themselves in a difficult situation because of economic and employment issues, and this caused inner tension and conflicts because they had to choose to support their livelihoods (by selling black wattle) or help protect the catchment water resources (by not selling black wattle).

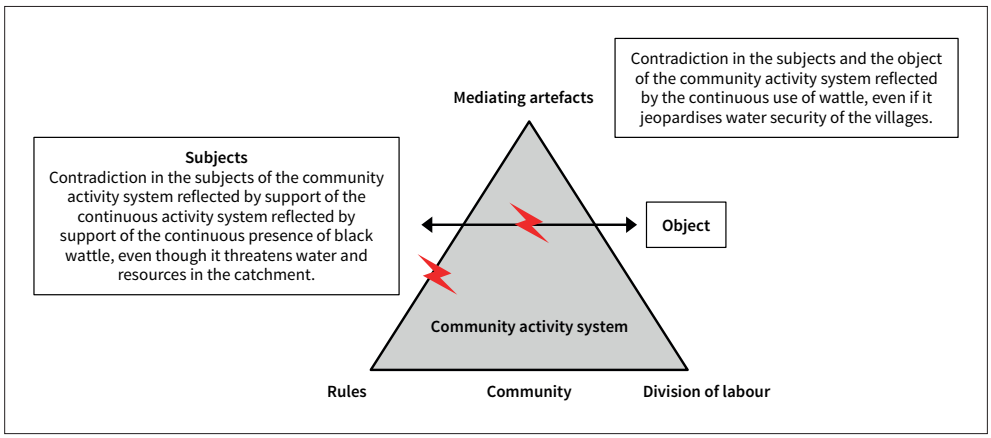


Figure 6: *Primary contradictions within the subject of the community activity system and secondary contradiction between the subject and object of the community activity system*

(ii) Tertiary contradictions between the rule element of the community activity system and the traditional leadership activity system

Tertiary contradictions in the ***rule*** element of the community activity system and the ***rule*** element of traditional leadership activity system, were surfaced through the contemporary black wattle management rules against the backdrop of traditional catchment norms and customs. The contradiction manifested as a ***dilemma*** because the users must sell the black wattle to feed their families and fulfil their roles as the providers but, at the same time, they need to abide by the community rules which do not serve their intentions and family duties. Black wattle is also used for certain cultural activities in the villages, such as rites of passage for young men.

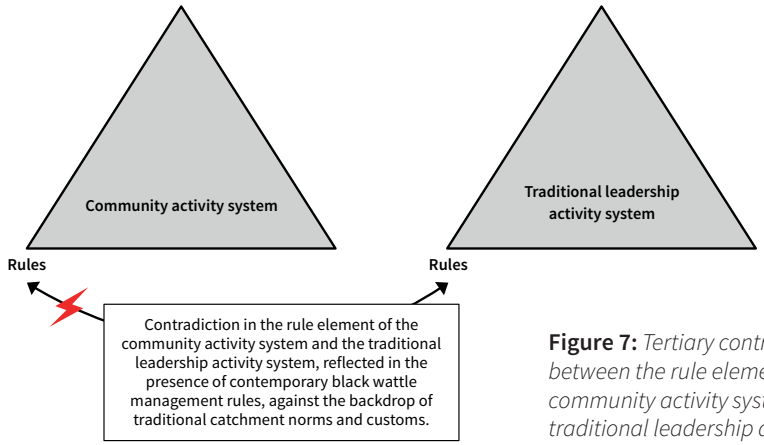


Figure 7: *Tertiary contradictions between the rule element of the community activity system and the traditional leadership activity system*

(iii) Tertiary contradictions between the subjects of the community activity system and the object of the traditional leadership activity system

Tertiary contradictions in the subjects of the community activity system and the object of the traditional leadership activity system, were reflected by the resistance and acceptance of wattle clearing/management by NGOs and partner organisations. This contradiction manifested as a ***critical conflict*** because the presence of black wattle influenced community safety as cattle thieves hide stolen cattle in the black wattle stands. This leads to heightened tensions and conflicts concerning removal of the black wattle in the catchment.

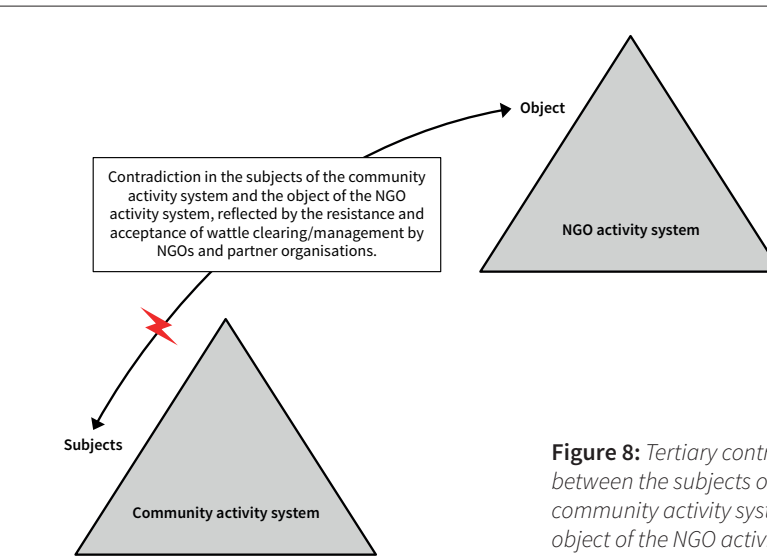


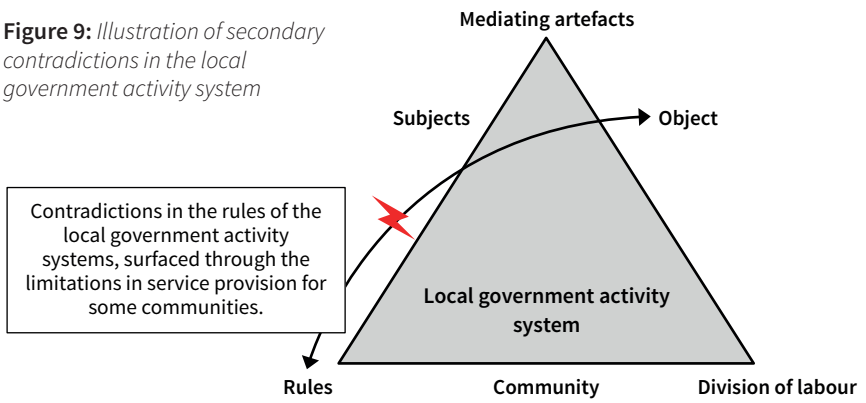
Figure 8: *Tertiary contradictions between the subjects of the community activity system and the object of the NGO activity system*

(c) Raw sewerage and stream pollution *(Figures 9 and 10)*

(i) Secondary contradictions in the local government activity system

Secondary contradictions in the ***rules*** and the ***object*** of the local government activity systems, surfaced through the limitations in service provision for some communities and system collapse. This manifests as ***isiphithiphithi*** because local government (municipality) is governed by laws and rules from the national government, and these rules include allocation of funds for certain purposes and not for any other issue or ward. These rules of governance are incompatible with the reality in the catchment (sewerage issues, water pipes bursting, etc.) and do not assist in solving the problems relating to service provision for some communities. Additionally, some community members do not adhere to waste disposal instructions issued by the municipality, and the outcome of the non-adherence results in continuous breaking down of the water and sewerage system of the catchment.

Figure 9: *Illustration of secondary contradictions in the local government activity system*



(ii) Secondary contradictions in the community activity system; and secondary contradiction between rules and tools

Secondary contradictions in the ***rules*** of the community activity system and the ***mediating artefacts*** and ***tools*** of the same activity system were reflected by the littering in the catchment. Secondary contradictions in the rules of the community activity systems and the ***object*** of the same activity system were reflected in the pollution in particular, the presence of disposable nappies in the landscape and water sources in the catchment.

Contradictions manifested as ***critical conflicts*** and ***double binds***. A **critical conflict** was evident in the lack of adherence to the tools and the rules about waste disposal which is affecting large parts of the villages. Community members tend not to follow the prescribed method of disposing waste, leading to widespread litter in the catchment, which is

detrimental to the environment and animals. In terms of a **double bind**, nappy disposal rules are difficult because communities do not always have the necessary infrastructure for this. Their temporary solution of disposing nappies near rivers was affecting the object of co-management of water resources as the disposable nappies polluted the water sources.

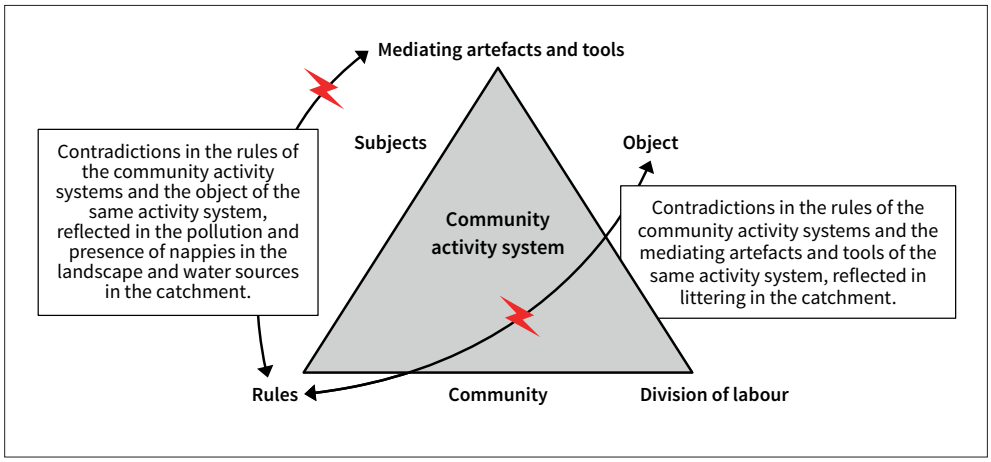


Figure 10: *Illustration of secondary contradictions in the community activity system; and secondary contradiction between rules and tools*

(d) Access to water *(Figures 11 and 12)*

(i) Secondary contradictions in the community activity system

Secondary contradictions in the ***rules*** of the community activity systems and the ***object*** of the same activity system, were reflected in the vandalism, stealing of water supply machinery and illegal water connections in the catchment. This manifested as a ***double bind*** because the lack of adherence to the rules relating to water access was causing tensions and had a paralysing effect on the municipal workers and other subjects in the community activity system. The issue of illegal water connections into homes created water provision issues for villages living upstream (because of water pressure issues) and this was further exacerbated by theft and vandalism of water supply equipment by some community members.

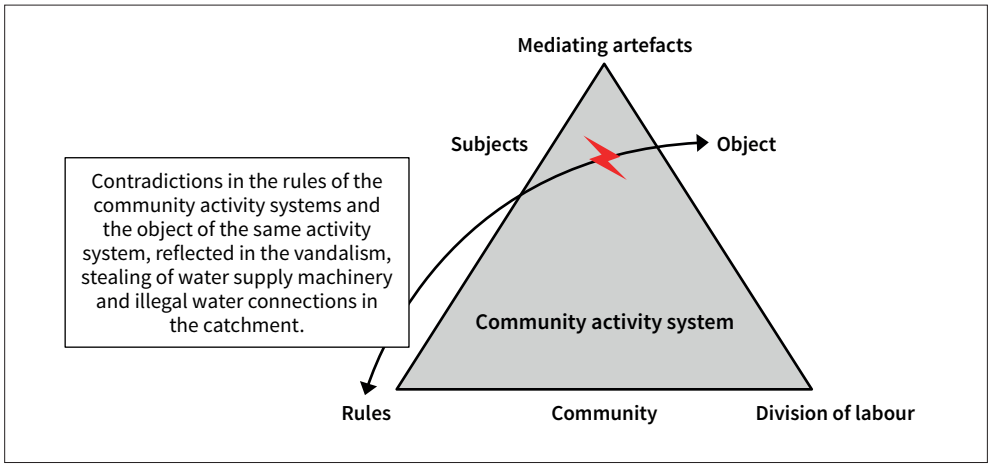


Figure 11: *Illustration of primary contradictions in the community activity system*

(ii) Quaternary contradictions between the local government activity system and the community activity system

Quaternary contradictions in the ***rules*** governing ***community*** actors in the local government activity system surfaced through corruption by water provision tender receivers, lack of delivery of fuel to communities and subsequent lack of water access in the communities. Quaternary contradictions in the ***rules*** governing the ***community*** actors in the local government activity system hinder achievement of the shared object with community activity system; this is reflected by the inability of the community activity to access water and by the local government activity system to provide water to the communities as the official and authorised service provider. The contradictions manifested as ***isiphithiphithi*** because of non-compliance with tender and water supply rules by the water service providers sanctioned by the local government activity system, resulting in communities not receiving water services. There was no adherence to legally instituted rules, which could potentially be a result of corruption in the system because money was made available for service delivery, but no water was delivered. This is a result of a failing system, which appeared to lack accountability, monitoring and ethical oversight.

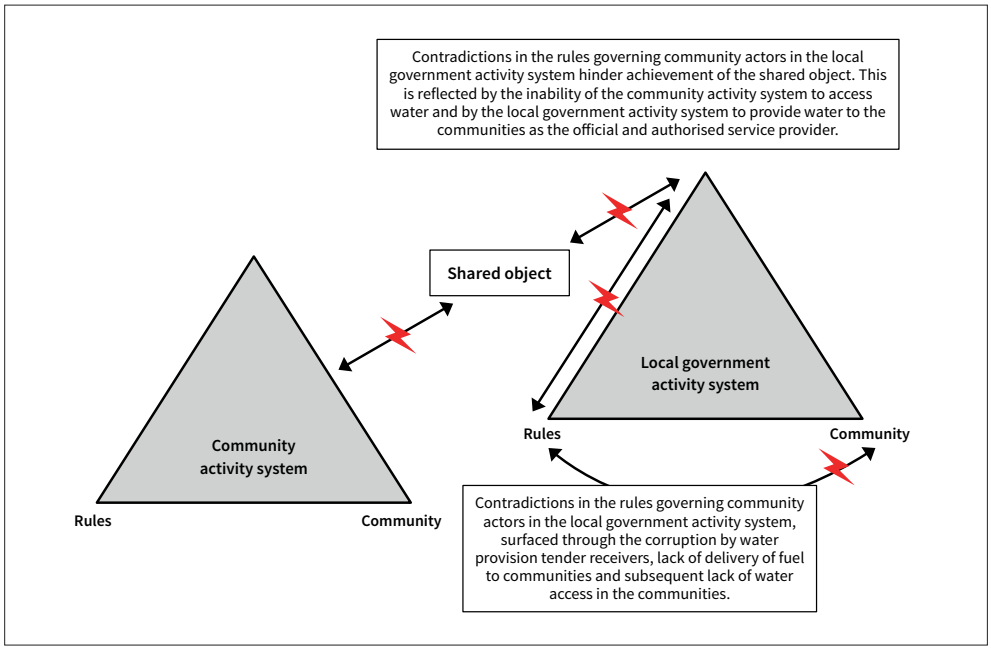


Figure 12: *Illustration of quaternary contradictions between the local government activity system and the community activity system*

(e) Degradation of wetlands *(see Figure 13)*

Tertiary contradictions between the traditional leadership and community activity systems

Tertiary contradictions in the ***mediating artefacts*** and ***tools,*** and ***subjects*** of the traditional leadership activity system, were reflected by illegitimate issuing of land by chiefs, building on dry wetlands and degradation on wetlands. Tertiary contradictions in the ***rules*** of the traditional activity system regarding wetland protection and the ***object*** of the community activity system, were reflected by community activity system subjects voicing their views about the unsanctioned occupations of wetlands and their subsequent degradation. The contradictions manifested as ***double binds*** and ***dilemmas***. In terms of **double bind**, the subjects of the traditional leadership activity system (chiefs) were under pressure to meet the housing needs of the villagers and earn money from selling plots of land. They therefore gave away vacant land which was in fact dry wetlands (due to droughts and minimal rainfall). This led to loss of livelihoods, flooding and property destruction during the rainy seasons. **Dilemmas** were expressed through different views of the community activity subjects regarding vacant plots of lands (which are dry wetlands); some required land to build, for livestock to graze and others needed the wetlands to be protected for the sake of water security for the entire catchment.

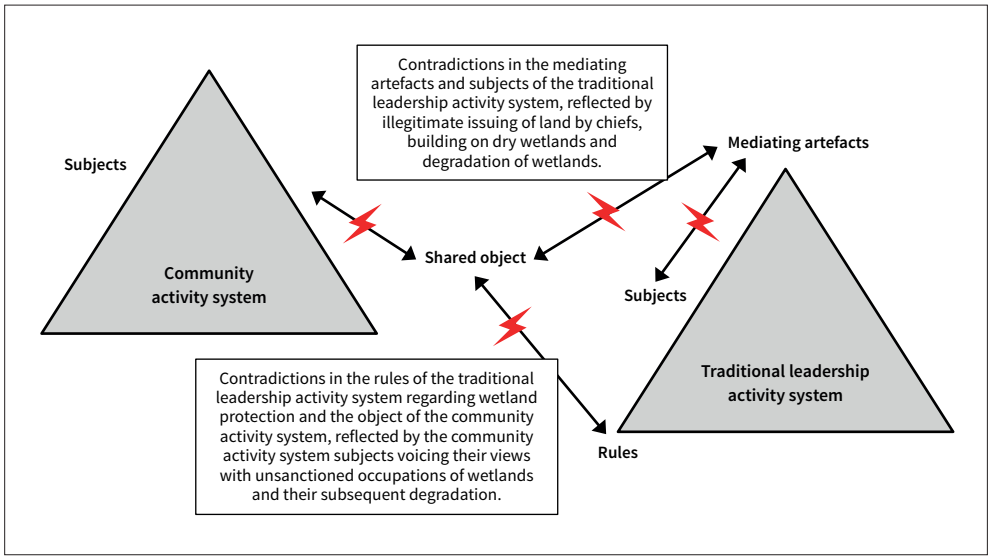


Figure 13: *Illustration of quaternary contradictions between the traditional leadership activity system and the community activity system*

Discussion and conclusion

Being a strategic water source area, the uMzimvubu catchment plays an important role in supplying its inhabitants and other areas with water. As can be seen above in Figures 4-13, contradictions associated with the provision of water manifested as dilemmas, conflicts, critical conflicts, double binds and as *isiphithiphithi* in this study. All these require context-based and innovative solutions. Resolution of *isiphithiphithi* requires all the actors influenced by, and the actors catalysing the *isiphithiphithi*, to cross boundaries and analyse the cultural history of the object of activity, and its relationship with the *isiphithiphithi*. This new term was particularly useful because it helps to paint a picture of the complexities of poor governance which plagues numerous communities in South Africa (and potentially other developing countries in Africa).

Interventions in communities which acknowledge already present indigenous knowledge have a higher probability of success because such indigenous knowledge has been tested over time, is widely accepted and has been generated through timeous and empirical interactions. What was evident through this study was that communities could use the theories and the tools they had acquired from the intervention to engage with their own particular contradictions and transform their activities related to water resources and other natural resources. However, a limitation of the study is that I was only able to work in one catchment for a limited period and the manifestation of the contradictions could have been different in other catchment contexts. In addition, the Living Catchments Project, of

which I was part, also had a limited timeframe (2019 to 2023). There is, therefore, potential to carry this work forward in other catchments and for a longer period.

From this study we can learn that in order to ensure a water secure catchment, water resources have to be co-managed by all the stakeholders involved, as was the case of the five surfaced activity systems working together in the uMzimvubu catchment. Expansive learning is a theory of and approach to learning that can assist with incorporating all stakeholders involved in a shared object and it accommodates different knowledges (such as indigenous knowledge and Western knowledge). For co-management of water resources to be a reality, boundary-crossing, co-learning and collaboration must be key components, and respect along with trust must be enshrined within all processes.

Notes on Contributor

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References

Calverley, C. M. & Walther, S. C. (2022). Drought, water management, and social equity: Analyzing Cape Town, South Africa's water crisis. *Frontiers in Water, 4*, 1-21.

De Dreu, C. K. W. & Van de Vliert, E. (Eds.). (1997). *Using conflict in organizations.* Sage. https://doi.org/10.4135/9781446217016.n2

Eaton, W. M., Brasier, K. J., Burbach, M. E., Whitmer, W., Engle, E. W., Burnham, M., Quimby, B., Kumar Chaudhary, A., Whitley, H., Delozier, J., & Fowler, L. B. (2021). A conceptual framework for social, behavioral, and environmental change through stakeholder engagement in water resource management. *Society & Natural Resources, 34*(8), 111-1132.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Orienta-Kunsultit.

Engeström, Y. (1999). Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen & R. L. Punamäki (Eds.), *Perspectives on activity theory* (pp. 377-404). Cambridge University Press.

Engeström, Y. (2018). *Expertise in transition: Expansive learning in medical work*. Cambridge University Press.

Engeström, Y., Engeström, R., & Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction: An International Journal*, *5*, 319-336.

Engeström, Y. & Sannino, A. (2011). Discursive manifestations of contradictions in organizational change efforts. *Journal of Organizational Change Management, 24*(3), 368-387. https://doi.org/10.1108/09534811111132758

Engeström, Y. & Sannino, A. (2012). Whatever happened to process theories of learning? *Learning, Culture and Social Interaction*, *1*, 45-56. https://doi.org/10.1016/j.lcsi.2012.03.002

Engeström, Y. & Sannino, A. (2020). Toward a Vygotskian perspective on transformative agency for social change. In A. T. Neto, F. Liberali & M. Dafermos (Eds.), *Revisiting Vygotsky for social change: Bringing together theory and practice* (Volume 2, pp. 87-109). Peter Lang.

Engeström, Y. & Sannino, A. (2021). From mediated actions to heterogenous coalitions: Four generations of activity-theoretical studies of work and learning. *Mind, Culture, and Activity, 28*(1), 4-23. https://doi.org/10.1080/10749039.2020.1806328

Freshwater Health Index. (2022). *uMzimvubu River Catchment, South Africa*. https://www.freshwaterhealthindex.org/projects/umzimvubu-catchment-south-africa

Garmendia, E. & Stagl, S. (2010). Public participation for sustainability and social learning: Concepts and lessons from three case studies in Europe. *Ecological Economics, 69*(8), 1712-1722.

Gedera, D. S. P. & Williams, P. J. (2013). Using activity theory to understand contradictions in an online university course facilitated by Moodle. *International Journal of Information Technology & Computer Science*, *10*(1), 32-41.

Kuse, M. (2024). *Exploring expansive learning and co-management in the uMzimvumbu catchment* [Unpublished doctoral thesis]. Rhodes University.

Le Maitre, D., Seyler, H., Smith-Adao, L., Maherry, A., Nel, J., & Witthűser, K. (2018). *Identification, delineation and importance of the strategic water source areas of South Africa, Lesotho and Swaziland for surface water and groundwater*. Water Research Commission Report No TT 754/1/18.

Leont'ev, A. (1978). *Activity, consciousness, and personality*. Englewood Cliffs. https://www.marxists.org/archive/leontev/works/activity-consciousness.pdf

Meissner, R., Funke, N., Nortje, K., Jacobs-Mata, I., Moyo, E., Steyn, M., Shadung, J., Masangane, W., & Nohayi, N. (2018). Water security at local government level in South Africa: a qualitative interview-based analysis. *The Lancet Planetary Health, 2*, 17.

Nel, J. L., Le Maitre, D. C., Colvin, C., Smith, J. S., & Haines, I. (2013). *South Africa's strategic water source areas.* CSIR report: CSIR/NRE/ECOS/ER/2013/0031/A.

Pesanayi, T. V. (2019). *Boundary-crossing expansive learning across agricultural learning systems and networks in southern Africa* [Unpublished doctoral thesis]. Rhodes University.

Reed, M. S., Vella, S., Challies, E., de Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., Neumann, R. N., Oughton, E. A., & Del Ceno, J. S. (2018). A theory of participation: What makes stakeholder and public engagement in environmental management work? *Restoration Ecology, 26*(S1), S7-S17. https://doi.org/10.1111/rec.12541

SANBI [South African National Biodiversity Institute]. (2020). *A theory of change for the Living Catchments project. A report to the Water Research Commission.* Pretoria.

SANBI [South African National Biodiversity Institute]. (2023). *Living Catchments project: Final Report.* Water Research Commission, Pretoria.

Sannino, A. (2020). Enacting the utopia of eradicating homelessness: Toward a new generation of activity-theoretical studies of learning. *Studies in Continuing Education, 42*(2), 163-179. https://doi.org/10.1080/0158037X.2020.1725459

Sannino, A. & Engeström, Y. (2018). Cultural-historical activity theory: Founding insights and new challenges. *Historical Psychology, 14*(3), 43-56. https://doi.org/10.17759/chp.2018140304

Vasilyuk, F. (1988). *The psychology of experiencing.* Progress.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

Yamagata-Lynch, L. C. (2010). Understanding cultural historical activity theory. In L. C. Yamagata-Lynch (Ed.), *Activity systems analysis methods. Understanding complex environments*. Springer.