Be Resilient Project, Cape Winelands Biosphere Region

Is the project a case of…:

☐ State-initiated co-creation

☐ Entrepreneur-driven co-creation

☒ Grassroots-based co-creation (NGO)*

For an elaboration of the typology, please consult the GOGREEN theoretical framework p. 25.

Integrated case analysis

Before proceeding to the scoring of the GFs, please provide a *3–5 page case analysis* in which you describe the background, history, and national, regional, and local contexts of the case, the problems and goals addressed by the local collaboration, the participating actors and their relationships, the unfolding of the co-creation process, the most important governance factors (this may include factors other than those in focus in this project), and the generated outputs and outcomes. The conclusion may specify a few lessons learned from the case study.

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1) Background, history, and national, regional, and local contexts of the case

South Africa has grappled with persistent challenges stemming from prolonged droughts over the last decade, shedding light on the nation's susceptibility to water scarcity. The looming threat of climate change further compounds water scarcity in South Africa by increasing the frequency and intensity of droughts, raising temperatures, and disrupting seasonal precipitation patterns. These changes not only diminish water availability but also compromise water quality and contribute to coastal saltwater intrusion. This necessitates a comprehensive approach to integrate climate change impacts into water planning for the foreseeable future.

In response to these challenges, the "Be Resilient" project emerged as an initiative managed by UNESCO's Regional Office for Southern Africa (ROSA). This project, funded by the Flemish Government of Belgium, signifies a departure from conventional methods by adopting a bottom-up participatory approach to climate change adaptation.

The initiative seeks to actively involve communities in developing bespoke solutions to address water scarcity. By directly engaging communities in decision-making processes, the project aims to tailor solutions that align with their specific needs. The Flemish Government's international support underscores a collaborative effort to navigate the intricate relationship between climate change and water scarcity in South Africa.

At its essence, the "Be Resilient" project strives to fortify resilience in South Africa's water management. Utilising ecosystem-based adaptation strategies, the initiative addresses immediate and long-term challenges associated with water scarcity. The participatory ethos not only equips local communities with tools to navigate climate change impacts but also fosters a sense of ownership and empowerment, laying the groundwork for a more sustainable future.

The project's initial implementation focuses on four South African Biosphere Regions, with this case study specifically delving into the Cape Winelands Biosphere Region in the Western Cape. Concentrating efforts on the Eerste River and its tributaries, the project collaborates with five communities: Jonkershoek, Idas Valley, Cloetesville, Khayamandi in Stellenbosch Local Municipality and Faure in Cape Town Metropolitan Municipality.

Stellenbosch and Cape Town are home to diverse communities with varying demographics, livelihoods, and socioeconomic backgrounds. Here's a brief overview of each of the involved communities:

Jonkershoek:
   a) Located in the Stellenbosch area, Jonkershoek is known for its picturesque surroundings, including the Jonkershoek Nature Reserve.
   b) The population of Jonkershoek is relatively small (approximately 2,000 people), primarily comprising residents who are involved in agriculture, tourism, and outdoor recreational activities.
   c) Livelihoods in Jonkershoek may include farming, especially vineyards and fruit orchards, as well as employment in the tourism sector, such as guesthouses, restaurants, and outdoor adventure companies.

Idas Valley:
   a) Idas Valley is a suburb in Stellenbosch, characterised by its mix of residential areas and light industrial zones.
   b) The population of Idas Valley of approximately 9,000 people is diverse, with residents engaged in various occupations, including blue-collar workers, professionals, and students attending nearby educational institutions like Stellenbosch University.
   c) Livelihoods in Idas Valley includes working in local industries, such as manufacturing, construction, or retail, as well as services catering to the university community.

Cloetesville:
   a) Cloetesville is a suburb of Stellenbosch with a predominantly working-class population of around 13,000 people.
   b) The community of Cloetesville faces socioeconomic challenges, including poverty and unemployment, which are common in many urban areas in South Africa.
   c) Livelihoods in Cloetesville includes informal sector activities, such as street vending or domestic work, as well as formal employment in nearby industries or services.

Khayamandi:
   a) Khayamandi is an informal settlement located near Stellenbosch, characterised by its informal housing and limited access to basic services.

b) It is home to approximately 25,000 inhabitants.
c) The population of Khayamandi is primarily made up of lower-income residents, many of whom have migrated from rural areas in search of better opportunities.
d) Livelihoods in Khayamandi includes informal sector activities, such as small-scale trading or artisanal work, as well as formal employment opportunities in Stellenbosch.

Faure:
a) Faure is a suburb located near Cape Town, situated within the larger metropolitan area and housing approximately 5,000 people.
b) The population of Faure is diverse, with residents engaged in various occupations, including commuting to nearby urban centers for work or education.
c) Livelihoods in Faure includes formal employment in industries or services in Cape Town or nearby industrial areas, as well as small-scale entrepreneurship or agriculture.

These communities represent a cross-section of the socioeconomic landscape in Stellenbosch and Cape Town, each with its own unique characteristics, challenges, and opportunities.

Despite the project's goals, the Cape Winelands Biosphere Region faces immediate issues related to water quality and cleanliness. The rivers are contaminated, rendering them unsuitable for swimming or drinking. Overflowing solid waste containers and rampant littering, particularly in informal settlements, exacerbate the problem. With summer approaching, children resort to unsafe swimming spots in the rivers, leading to health concerns.

The lack of proper waste disposal contributes to the pollution of water sources, with visible consequences for the environment and the community. Urgent measures are needed to educate the public on responsible waste management and enforce security measures to discourage littering. Additionally, infrastructure improvements, such as the construction of bridges for schoolchildren during rain and flooding, are vital to ensuring safer river crossings.

As the "Be Resilient" project progresses, the focus shifts towards disaster risk management, guided by the Collaborative Research for Integrated Development in Africa (CRIDA). The current stage involves the development of suggested adaptation options, with the next phase emphasizing more detailed feasibility studies to address the pressing water problems in the region.

The "Be Resilient" project serves as a beacon of hope in tackling the complex intersection of climate change and water scarcity in South Africa. Despite the challenges faced, the initiative holds promise for creating lasting positive change through community engagement, ecosystem-based strategies, and a commitment to sustainable water management practices.

Unfortunately, there are potential conflicting interests in the region between economic interests and the interests in addressing water scarcity problems. Stellenbosch has emerged as a dynamic area experiencing notable growth and development across various sectors. Central to its progress is Stellenbosch University, a renowned educational institution drawing students, researchers, and academics, establishing the town

as an education hub. Additionally, Stellenbosch's scenic beauty and flourishing wine industry have transformed it into a popular tourism destination, attracting visitors globally and bolstering economic activity. Moreover, the region has become a hotspot for innovation and technology, fostering a vibrant ecosystem of startups, research facilities, and innovation hubs. Its agricultural sector, particularly in wine production, remains a significant economic driver, complementing the area's diverse economy. Infrastructure development has further propelled growth, with investments in residential, commercial, and transportation infrastructure enhancing livability and accessibility.

Industries and agriculture are significant users of water in the study area. However, their water consumption can conflict with conservation efforts and the need to allocate water for ecosystems and biodiversity preservation. Balancing economic activities with water conservation measures can be challenging, especially during periods of drought when water resources are limited. In addition, continuous urbanization and infrastructure development in Stellenbosch requires substantial water resources for construction, manufacturing, and municipal services. These activities can strain water supplies and infrastructure, exacerbating water scarcity issues.

However, as Stellenbosch continues to evolve, managing urbanization, infrastructure needs, and sustainability challenges remains imperative to ensure balanced and inclusive development for its residents and stakeholders.

2) The aims of the project and the sustainability problems that it seeks to address
The project aims to provide capacity building of national and local stakeholders and technology transfer on innovative tools for climate change adaptation and monitoring. This is done by upskilling Citizen Scientists to use the mini-South African Scoring System (SASS) and the Kartoza mobile application for river and stream monitoring. It is a simple tool which can be used by anyone to monitor the health of a river by recording and scoring the macroinvertebrates (small animals) found in a sample of the river water. It furthermore engages ordinary citizens and involves them in the understanding the importance of conserving and protecting their valuable water resources.

The data collected by Citizen Scientists using the mini-South African Scoring System (SASS) and the Kartoza mobile application serves multiple purposes. Firstly, it provides valuable insights into the health of rivers and streams, aiding in the assessment of water quality and ecosystem health. This data can inform decision-making processes for water resource management, pollution control measures, and habitat restoration efforts. Additionally, the data can contribute to scientific research and monitoring programs, helping to track long-term trends in river health and biodiversity.

The project aims to educate and empower citizens to become actively involved in the conservation and protection of water resources. Through hands-on participation in river monitoring activities, citizens gain a deeper understanding of the interconnectedness between human activities and environmental health. This understanding can lead to behavioral changes, such as adopting more sustainable practices in water usage, reducing pollution inputs into rivers, and advocating for policy changes to safeguard water quality and ecosystems.

The project recognizes that current behaviors, such as improper waste disposal, agricultural runoff, and industrial pollution, contribute to the degradation of water quality and ecosystem health in rivers and streams. By engaging citizens in monitoring activities and raising awareness about the impacts of these behaviors, the project seeks to foster a sense of responsibility and stewardship among communities. Encouraging individuals to take ownership of their local water resources can help address the root causes of pollution and degradation, ultimately leading to more sustainable water management practices.

In essence, the project aims to harness the collective efforts of Citizen Scientists to generate data-driven insights into river health while simultaneously fostering a culture of environmental stewardship and sustainable behavior among communities. By combining scientific monitoring with community engagement and education, the project strives to create meaningful and lasting impacts on water resource management and conservation efforts.

Photos by Charlotte Nell.

3) The participants and their interaction and communication in and between meetings
The core partners are the Cape Winelands Biosphere Region (CWBR) and UNESCO ROSA

a) **CWBR** is a registered non-profit organisation acting as lead partner.

1. CWBR is a distinctive geographic area in the Western Cape, South Africa, recognised for its unique natural and cultural characteristics.
2. As a biosphere reserve, CWBR is committed to balancing conservation efforts with sustainable development.
3. It encompasses diverse landscapes, including renowned winelands, and plays a pivotal role in preserving biodiversity while fostering community engagement.
4. The region actively collaborates with stakeholders, operates under the auspices of UNESCO, and employs innovative strategies for managing natural resources and promoting resilience in the face of environmental challenges.
5. CWBR's initiatives reflect a harmonious integration of conservation, sustainable development, and community participation.
6. Citizen Scientists are the foot soldiers for this project and play a key role, under the leadership of CWBR.
    i. Citizen Scientists are vital participants in this project, actively engaged in monitoring river health and contributing to data collection efforts under the guidance of CWBR.
    ii. They play a hands-on role in using the mini-South African Scoring System (SASS) and the Kartoza mobile application to assess the health of rivers and streams.

     iii.   Selected based on their interest, commitment, and local knowledge, Citizen Scientists are chosen by CWBR through community outreach programs, workshops, and partnerships with local organizations.

     iv.   Through their involvement, Citizen Scientists not only gain valuable skills in environmental monitoring but also become champions for water conservation and ecosystem protection within their communities.

b) **UNESCO ROSA,** or the United Nations Educational, Scientific and Cultural Organization's Regional Office for Southern Africa, is a specialised agency within the United Nations system.
1. Established in 1945, UNESCO is dedicated to promoting international collaboration in the fields of education, science, culture, and communication.
2. Its mission is to build a just, inclusive, peaceful, and knowledgeable global community by fostering the exchange of ideas, preserving cultural heritage, advancing scientific knowledge, and promoting access to quality education.
3. Based in Harare, Zimbabwe, ROSA serves as a hub for coordinating UNESCO's activities and initiatives in the Southern Africa region.
4. It works in collaboration with member countries and various partners to promote education, science, culture, communication, and information in the region.
5. ROSA plays a vital role in supporting sustainable development, fostering cultural diversity, and advancing knowledge and skills within the Southern African context. It serves as a platform for regional cooperation and the exchange of ideas in alignment with UNESCO's global objectives.

Other participants include:
a) **Government of Flanders:**
1. The Government of Flanders, representing the northern Dutch-speaking region of Belgium, is actively involved in providing development aid to South Africa.
2. As a donor organisation, it contributes financial support to projects that align with shared priorities and objectives between Flanders and South Africa.
3. The funding is typically directed toward initiatives addressing key development challenges, such as socio-economic development, education, healthcare, and such as in this case, environmental sustainability (more specifically, water resource management).
4. The collaboration between the Government of Flanders and South Africa reflects a commitment to fostering positive bilateral relations and supporting targeted efforts to enhance the well-being and resilience of communities in South Africa.

b) **The South African National Department of Water and Sanitation**
1. The South African National Department of Water and Sanitation is a government agency responsible for formulating and implementing policies, strategies, and programs related to water resources and sanitation in South Africa.
2. Established to address the country's water management challenges, the department plays a crucial role in ensuring sustainable and equitable access to water resources, as well as promoting effective sanitation practices.

3. Its mandate encompasses the development and management of water infrastructure, water quality monitoring, and the coordination of water-related projects.
4. The department actively engages in addressing issues such as water scarcity, pollution, and infrastructure development to enhance the overall water and sanitation services for the benefit of South Africa's residents.

c) **Cape Nature**
1. CapeNature is a public institution responsible for biodiversity conservation and sustainable resource management in the Western Cape Province of South Africa.
2. CapeNature is tasked with conserving the biodiversity of the Western Cape, including the ecosystems associated with water resources such as rivers, wetlands, and estuaries. Biodiversity conservation contributes to the overall health of ecosystems and their resilience to environmental changes.
3. The organisation manages a network of nature reserves and protected areas across the Western Cape. These areas include critical water catchment zones, and CapeNature implements measures to protect water sources and maintain ecological balance.
4. CapeNature collaborates with various stakeholders, including government departments, NGOs, and local communities, to address ecosystem-related challenges collaboratively.

4) How often do they meet, and do they communicate between meetings?

At a managerial level, the Project Partner Steering Feedback Committee convenes on a quarterly basis, fostering regular discussions and decision-making. Ad-hoc communication is facilitated through email channels. The Project Partner Steering Feedback Committee includes representatives from the Government of Flanders, UNESCO ROSA, the Council for Scientific and Industrial Research (CSIR), and the South African Water Research Commission, amongst others.

Operationally, CWBR maintains near-daily communication with Citizen Scientists, utilizing mobile messaging platforms, specifically WhatsApp groups. Monthly operational meetings provide a structured forum for collaboration. Additionally, community engagement sessions, focusing on feedback and information sharing with broader communities, are organized as needed, typically occurring approximately twice per year.

5) The role and forms of knowledge sharing, coordination and joint problem-solving

The project embraced diverse approaches to encourage knowledge sharing, coordination, and joint problem-solving. Notably, it fostered community engagement and knowledge sharing by actively involving local communities, including Citizen Scientist groups, schools, and individuals. Regular community meetings and consultations served as platforms for sharing information about the project, environmental challenges, and potential solutions. Within these forums, communities actively participated in discussions, contributing local knowledge to collaborative problem-solving efforts.

Another crucial aspect was the facilitation of inter-agency collaboration involving governmental entities, NGOs, and institutions. The project engaged with stakeholders such as the Department of Water and

Sanitation (DWS), Cape Nature, and others. This collaborative approach brought together expertise from various organizations to collectively address water quality and ecosystem challenges.

Technology played a vital role in facilitating collaboration, with the implementation of the Kartoza app for monitoring water quality data by Citizen Scientists. This technological tool streamlined data collection, minimized human error, and provided a centralized platform for efficient information sharing.

Stakeholder forums and meetings served as spaces for diverse participants to engage in discussions on project progress, challenges, and potential solutions. Steering committee meetings, forums, and check-in/reflection processes provided opportunities for collective decision-making.

Training and capacity building were integral components, empowering community members with knowledge and skills. Training sessions covered water quality monitoring, environmental education, and technical aspects of the project, enabling communities to actively contribute to identifying and solving environmental challenges.

Continuous learning and improvement were achieved through adaptive learning and feedback mechanisms. Evaluation sections in project reports, partner steering meetings, and external reviews facilitated feedback loops, allowing for adjustments in project strategies and problem-solving approaches.

Inclusive decision-making processes were emphasized, ensuring diverse voices were heard in community meetings and consultations. This approach promoted joint problem-solving by considering a wide range of perspectives and insights.

Informal communication and collaboration were encouraged through channels like WhatsApp groups, facilitating quick and direct communication, especially during events like floods.

Documentation and reporting played a pivotal role in sharing progress, challenges, and outcomes. Each project report included an evaluation section, contributing to shared understanding, reflection, and collaborative problem-solving based on the project's evolution.
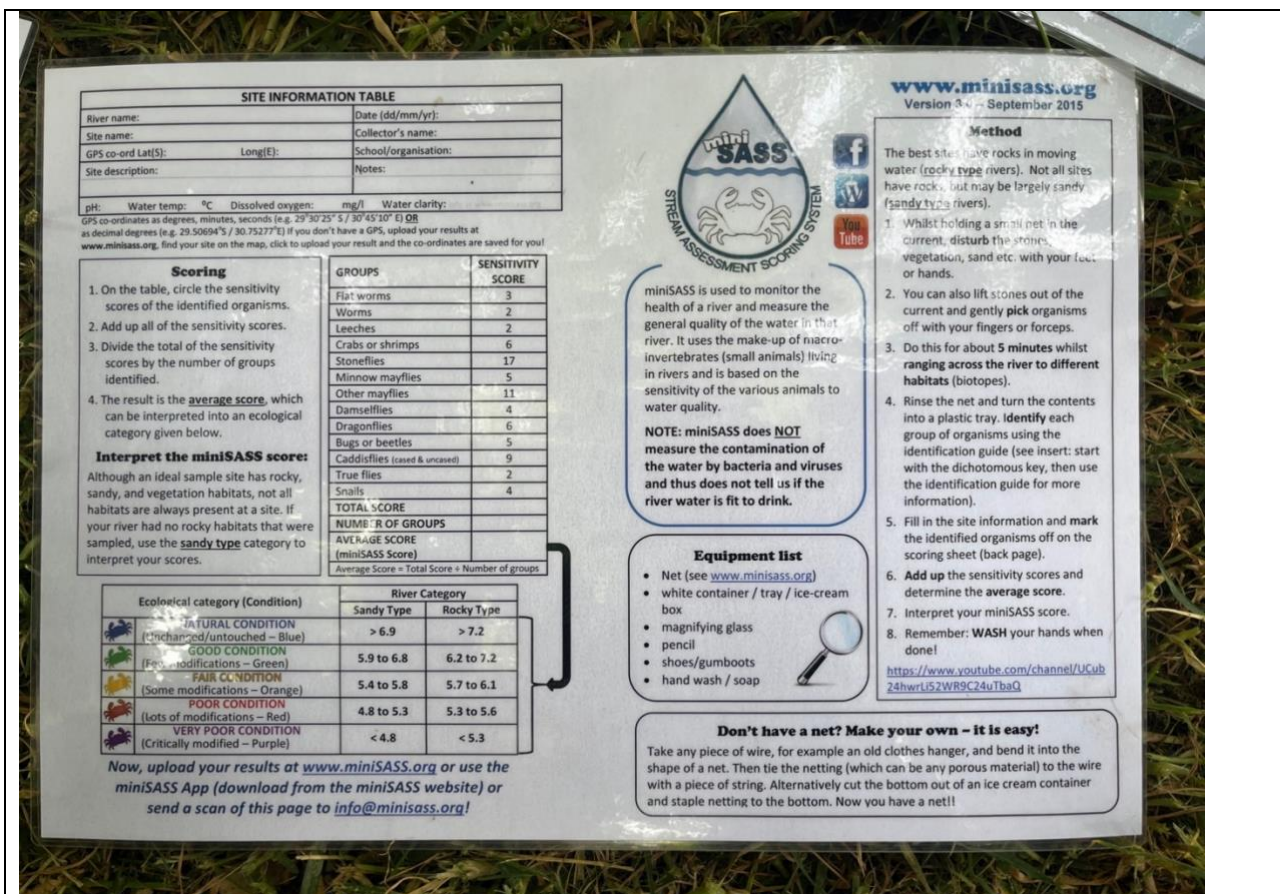
Photo by Charlotte Nell.

6) The relation between consensus and conflict and the handling of the latter

Given the participation of five geographically distinct communities in this project, cultural differences became evident right from its commencement. Two predominant cultures were identified: the Coloured community, primarily communicating in Afrikaans, and the Xhosa community, predominantly using isiXhosa. The **initial and foremost challenge encountered was the language barrier**. During interactions, Citizen Scientists took offense when a foreign language was used in their presence, assuming it was employed for gossiping about others. The project manager noted a palpable tension during the Citizen Scientists' inception meeting, describing it as something that could be "cut with a knife."

To address this issue, stringent guidelines were established through the collaborative **development of a Code of Conduct**. All Citizen Scientists were actively engaged in its creation, contributing to the formulation of rules in small groups, which were later consolidated. These rules included:

a) Only English could be used as the language medium when different groups of Citizen Scientists were together.

b) Citizen Scientists were prohibited from mocking each other, especially in relation to their English language proficiency.

Furthermore, Citizen Scientists were given the opportunity to articulate their collective expectations from the Cape Winelands Biosphere Region (CWBR).

The Code of Conduct proved effective throughout the project's duration as Citizen Scientists felt a sense of ownership, understanding that **breaking the rules meant violating the standards they had designed themselves**.

While some conflict was noted during the commencement of the project among Citizen Scientists, it was evident that all five communities interviewed mentioned that the project itself did not instigate any conflict within the broader community.

7) The role and form of leadership: lead actor, steering group and/or collective leadership

On a project management level, a Project Partner Steering Feedback Committee serves as the formal steering group. Quarterly meetings are held to report activities, project progress, and discuss recommendations for the project's future direction. Partnerships, challenges, and successes are also addressed in these sessions. CWBR provides direct reports to UNESCO's African Regional Office in Harare, Zimbabwe, where the UNESCO team actively facilitates collaborative problem-solving.

On an operational level, working with municipal-appointed ward councilors has proven challenging, as they often dominate discussions, representing communities instead of allowing individual voices to be heard. This project has addressed this issue by establishing a system that ensures individual community voices are heard, allowing plans to be developed accordingly. The identified actions, called adaptations, now require an assessment of feasibility and affordability. Notably, the suggestions made are already supported as they were co-developed.

8) The temporal unfolding of the co-creation process: major shifts and ups and downs

The co-creation process exhibits a temporal evolution marked by significant shifts and dynamic phases, replete with both accomplishments and challenges. This section delves into the intricacies of this journey, focusing on the involvement of Citizen Scientists and community groups.

Citizen Scientists (CS): The recruitment of CS commenced through existing partnerships held by CWBR. In the initial three months, the process underwent a period of flux, with individuals joining and leaving the project. In Jonkershoek, CapeNature's extensive involvement aided in identifying individuals for the core CS group. Idas Valley benefitted significantly from the support of the established Idas Valley Community Trails NGO. In Cloetesville, a dynamic youth participant played a crucial role in establishing necessary connections. Khayamandi relied on the Lockshan Foundation, a local NGO, for integral assistance, and explorations were made on foot in Faure (the location furthest from CWBR's base) when investigating the river source, establishing connections with residents during the site visit. Engagements with these individuals subsequently led to further meetings.

During Phase 1, CS primarily observed without active participation in organising. However, in Phase 2, a pivotal transformation occurred. CS actively engaged in meeting logistics, showcasing their upskilling in organisational tasks such as note-taking, translating, and presenting. This shift not only facilitated the operational aspects but also became integral to the personal and professional growth of the CS.

Community Groups: The formation of community groups by CWBR involved deliberate efforts to ensure diversity in terms of gender, age, and representation. Emphasis was placed on achieving gender balance, resulting in over 50% female participation in community meetings. The age range spanned from 17 to 88 years, intentionally avoiding limitations to encourage broad inclusivity.

Recognising the complexity of communities like Khayamandi, which consists of 13 different wards and ward councillors, the approach aimed at engaging a spectrum of representatives rather than relying on a single individual to represent an entire community.

The composition of core groups within communities demonstrated stability, although members underwent transitions due to full-time employment or involvement in alternative projects. Notably, the availability of committed individuals was never a concern, with those unable to commit often providing references for replacement. Notably, the community meetings witnessed active participation due to genuine interest, evidenced by the preparation of cooked meals to foster a communal atmosphere.

9) The most important governance factors
Several governance factors stand out as particularly important for the success and impact of the project. Here are the most notable governance factors:

Governance Factors 3, 5, 10
The active **involvement and collaboration with governmental bodies**, such as the Department of Water and Sanitation (DWS), the Department of Agriculture and Development Planning (DADP), and municipal authorities, are crucial governance factors. This collaboration ensures alignment with formal legislative frameworks, access to resources, and support for the project's objectives

Governance Factors 4, 5, 6, 7
The emphasis on **community engagement and empowerment** is a pivotal governance factor. By involving local communities in decision-making processes, educating them about environmental issues, and fostering a sense of ownership, the project ensures that interventions are culturally sensitive, locally relevant, and sustainable.

Governance Factors 11, 12, 13
The project's focus on **trust-building and conflict mediation** among Citizen Scientist groups from different communities is essential for effective collaboration. This governance factor ensures that diverse voices are heard, cultural differences are respected, and potential conflicts are addressed constructively, fostering a positive working environment.

Governance Factors 15, 16
The project's **adaptive approach**, particularly in response to challenges encountered during the implementation of the app for monitoring, reflects a governance factor that prioritizes flexibility and inclusivity. Adaptability allows for continuous improvement based on feedback, ensuring that tools and methodologies remain user-friendly and accessible to all community members.

Governance Factor 15

The incorporation of **formal evaluation processes** in each project report, along with external reviews from entities like UNESCO, highlights a commitment to ongoing critical self-reflection and learning. This governance factor ensures that the project remains responsive to community needs, addresses challenges, and continuously improves its strategies.

10) The generated outputs and outcomes

The **formation and collaboration of CS groups** in different communities represent a tangible output of the project. These groups are actively engaged in monitoring and addressing environmental issues, particularly related to water quality. CS actively monitor water quality in rivers and streams using tools such as the mini-South African Scoring System (SASS) and the Kartoza mobile application, identifying areas of concern and tracking changes over time. Additionally, they play a crucial role in identifying sources of pollution and reporting incidents to relevant authorities, prompting swift action to address issues such as illegal dumping and industrial runoff. Engaging in community education and outreach, they raise awareness about environmental issues and promote sustainable practices. They participate in stakeholder meetings and advocacy campaigns to influence decision-making processes.The efforts of Citizen Scientists demonstrate their commitment to environmental stewardship and driving positive change for sustainable water management within their communities. Although they saw themselves as separate communities from each other at project commencement, they soon realised they were joined through the river and that the project's success depended on them working together and becoming a singular unit.

The development and implementation of the **Kartoza mobile application** for monitoring water quality demonstrate a technological output. While the app faced initial challenges, especially related to the basic level of education of some of the CS, its ongoing development reflects an adaptive approach to improve and streamline data collection.

Empowering local communities through education, awareness campaigns, and active involvement in decision-making processes around their local river is a significant output. This empowerment is intended to create a sense of ownership and responsibility for local environmental issues.

The active engagement of CS groups and the use of the monitoring app and miniSASS contribute to **improved water quality monitoring**. This outcome enhances the understanding of local water ecosystems and supports informed decision-making.

The project's emphasis on **community engagement** and education has led to increased awareness of environmental issues and a higher level of community involvement. The project's emphasis on community engagement and education was integral to fostering a sustainable and environmentally conscious community. By increasing awareness of environmental issues and encouraging active participation, the project aimed to instigate behavioral change among community members. This involves adopting water conservation practices, reducing pollution, and advocating for policies supporting environmental protection. Through participation in monitoring activities and educational initiatives, community members developed a sense of ownership over their local environment, fostering a proactive approach to addressing environmental challenges. By working together, communities realied they can share resources, expertise,

and implement effective solutions to ensure the long-term sustainability of water resources. Ultimately, the project was able to cultivate a culture of environmental stewardship and resilience, enabling communities to adapt to changing environmental conditions and preserve water resources for future generations. This outcome is essential for building a sustainable and environmentally conscious community.

The project's outcomes encompass **capacity building within communities**, which involves providing training on water quality monitoring and environmental conservation. Through these initiatives, community members acquired a range of skills and knowledge essential for effective participation in environmental stewardship. Specifically, they learnt various techniques for assessing water quality, including the use of tools such as the mini-South African Scoring System (SASS) and the Kartoza mobile application. Participants became adept at collecting water samples, conducting field measurements, and analyzing data to evaluate the health of rivers and streams. Moreover, training included the identification of macroinvertebrates, which serve as crucial indicators of water quality, as well as understanding environmental indicators such as pH levels, dissolved oxygen, and pollutant concentrations. With enhanced data interpretation and analysis skills, community members can make informed decisions based on monitoring results and communicate findings to relevant stakeholders for action. Additionally, they received instruction in community engagement, communication, and advocacy techniques, enabling them to effectively raise awareness, advocate for environmental protection measures, and mobilize support for conservation initiatives. Ultimately, these acquired skills and knowledge empower community members to actively contribute to protecting and preserving water resources, promoting environmental sustainability, and building resilient communities.

As a result of this project, the Idas Valley community has already initiated actions to clear a nature area, recognizing its potential for ecotourism. The project has instilled a sense of ownership and motivation within the community, inspiring efforts to reclaim the river. Noteworthy changes include a reduction in illegal dumping and the initiation of small-scale recycling projects. Remarkably, the community has become proactive in self-policing, discouraging improper waste disposal without relying solely on external interventions. The engagement has heightened awareness of water and climate contexts, amplifying the community's commitment to environmental stewardship.

11) Lessons learned about the conditions for co-creating green solutions
Active involvement of local communities, including CS groups, schools, and communities, proves indispensable for the success of green solutions. The project places a strong emphasis on ensuring that solutions are not only pertinent but also widely accepted and sustainable through robust community engagement.

Recognizing and addressing language and cultural differences is pivotal for fostering effective collaboration. The project's implementation of a code of conduct successfully mitigated initial language barriers within Citizen Scientist groups, highlighting the significance of cultural sensitivity in co-creation efforts.

Inclusive decision-making processes are highlighted as essential for enhancing the legitimacy and effectiveness of green solutions. The project actively promotes community meetings and consultations, ensuring diverse voices are heard and emphasizing inclusivity to improve the relevance and acceptance of implemented solutions.

Facilitative leadership is acknowledged as playing a pivotal role in creating a positive team dynamic and effective collaboration. CWBRs facilitative leadership style creates an environment where individuals feel free to ask questions and actively contribute.

Continuous self-reflection, evaluation, and learning are deemed integral to the success of co-created solutions. The project incorporates evaluation sections in each report, emphasizing the importance of continuous learning and improvement.

Scoring and analysis of governance factors

1. Perceived importance of biosphere conditions

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

CWBR orchestrated a transformative experience during a river exploration, guiding CS through the journey of the Eerste River from its source to the sea. At each stop along the way, CS were encouraged to immerse themselves in the refreshing water, symbolizing a connection with the river's essence. However, as the expedition progressed, CS became increasingly hesitant to engage in this recreational activity. The reason for their reluctance became apparent – the visible pollution and degradation of the river became more pronounced downstream.

This experiential exercise served as a powerful illustration of the detrimental impact of human activities on the river's health. Witnessing the extent of pollution firsthand underscored the critical importance of preserving the river's cleanliness and safeguarding its water quality. The realization prompted a shift in the perspective of the Citizen Scientists, emphasizing the urgent need for environmental stewardship.

The profound impact of this experience resonated with the CS, compelling them to carry the message back to their respective communities. By sharing their insights and knowledge gained from the river exploration, they became advocates for river conservation and environmental education. In doing so, the CS played a pivotal role in spreading awareness and fostering a deeper understanding of the responsibility each community bears in preserving the health and vitality of the river.

The excursion provided a vivid portrayal of the river's environmental degradation, prompting a reevaluation of perceptions. Previously cherished as a recreational space, the river now poses concerns of pollution, deterring community members from once-enjoyed activities like making mats and brooms from reeds. The adverse impact on economic activities underscores the tangible consequences of deteriorating biosphere conditions.

Khayamandi's residents highlights the community's inherent concern for water conservation, exemplified by shifts in household water usage patterns. Small, yet meaningful, alterations in daily habits and behaviors reflect an evolving consciousness regarding water sustainability at the household level. While acknowledging the participants' understanding of their environmental context, the community emphasizes the need for further awareness initiatives to deepen community knowledge.

Among the interviewees, there was a broad consensus regarding the severity of biosphere conditions, particularly concerning the Eerste River's degradation. The river exploration experience illustrated the extent of pollution and environmental degradation, prompting a reevaluation of perceptions among Citizen Scientists (CS). Witnessing the visible pollution downstream served as a stark reminder of the detrimental impact of human activities on the river's health. This realization resonated deeply with CS, compelling them to advocate for river conservation and environmental education within their communities. The shared understanding of the urgent need for environmental stewardship served as a key motivational factor for collaboration, as CS recognized the critical importance of preserving the river's cleanliness and safeguarding its water quality. This consensus among interviewees underscores the widespread recognition of the severity of biosphere conditions and highlights the collective commitment to addressing environmental challenges through collaborative action.

2. Legislation, programs, and formal goals

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☐ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The project demonstrates alignment with existing legislation, programs, and formal goals related to water management in South Africa. Several key aspects highlight the project's adherence to regulatory frameworks and its contribution to formal goals:

a) National Water Act Compliance: The project operates within the framework set by South Africa's National Water Act. This legislative foundation emphasizes sustainable water resource management, protection of water quality, and equitable access to water resources. By addressing issues such as water quality, illegal dumping, and community engagement, the project aligns with the broader objectives outlined in the National Water Act.

b) Collaboration with Governmental Bodies: The collaboration with the Department of Water and Sanitation (DWS), the Department of Agriculture and Development Planning (DADP), and other governmental entities reflects the project's integration into formal structures and programs. These collaborations indicate a commitment to working in tandem with established authorities, contributing to the realization of governmental water management goals at both provincial and national levels.

c) Educational Initiatives in Alignment with Department of Education: The project's engagement with the Department of Education highlights its commitment to formal educational goals set by the government. By incorporating environmental education into the curriculum, the project not only addresses water-related issues but also aligns with broader educational objectives outlined by the Department of Education. This integration ensures that environmental awareness becomes an integral part of formal education programs.

d) SDG 6 Alignment: The project emphasizes the United Nations Sustainable Development Goal (SDG) 6, which focuses on ensuring the availability and sustainable management of water and sanitation for all. The awareness and actions promoted by the project directly contribute to achieving SDG 6 targets at the local level. This alignment underscores the project's commitment to international goals that South Africa has pledged to support.

e) Community Policing Initiatives: The shift towards community policing, where the community takes an active role in monitoring and addressing environmental concerns, aligns with broader governmental goals of community engagement and participation in governance. This approach resonates with South Africa's objectives of fostering community-driven initiatives for sustainable development.

f) Legislative Feedback Loops: The project incorporates feedback loops in the form of steering committee meetings, forums, and evaluations. These mechanisms create opportunities for ongoing collaboration with governmental bodies, aligning project activities with evolving legislative priorities and ensuring adaptability to changing formal goals.

In the South African context, where water scarcity and environmental degradation are critical challenges, projects that align with existing legislation and formal goals play a crucial role. The project's adherence to legal frameworks and collaboration with governmental bodies enhances its legitimacy and potential for scalability.

3. Relative openness of public governance paradigms

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☒ 0.33	☒ Medium confidence	☒ Documents
☐ 0.66	☐ High confidence	☒ Observations
☐ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

In the broader South African context, where water management challenges are significant, the relative openness of public governance paradigms becomes imperative. South Africa faces complex water-related issues, including scarcity, pollution, and resource management. Embracing an open governance approach in projects like the one discussed ensures that the collective intelligence of communities, governmental bodies, and other stakeholders is harnessed to address these challenges collaboratively.

The project collaborates with government institutions at various levels, including the Department of Water and Sanitation (DWS), Department of Agriculture and Development Planning (DADP), and municipal authorities. This demonstrates a commitment from the national and municipal government institutions to work with community-driven initiatives. The relative openness of these government entities to collaborate with the project promotes a synergistic relationship between community-driven initiatives and official governance frameworks.

Despite fruitful partnerships with external organizations, challenges persist in cooperation with the local municipality. Historical associations from 2012 to 2018 faced disruptions due to turnover in the water management unit, highlighting the need for sustained collaboration and consistent engagement with municipal authorities for effective water management initiatives.

Acknowledging the inherent skepticism towards government bodies, the "Be Resilient" project emphasizes the importance of collaboration as a strategic imperative. Building trust through partnerships with NGOs and fostering relationships with local communities is vital for addressing suspicions and promoting collective efforts in environmental stewardship.

The project adopts a citizen science approach, empowering community members to actively participate in monitoring and addressing environmental challenges. By involving citizens as scientists, the project embraces an open governance paradigm that values community knowledge and contributions in the decision-making process. This participatory model fosters transparency and inclusivity in environmental management.

Willingness has been shown by public governance paradigms including community leaders, ward councilors, national government and the local municipality (albeit to a lesser extent) to engage with the project. This reflects an openness to incorporating diverse perspectives into the decision-making process and to not solely rely on top-down directives. A score of 0.33 has been achieved because there are examples of government bodies on both national and local level actively participating in the project. However, significance (0.66) has not been established because there was no evidence found that government bodies actively created initiatives on behalf of the project such as contacting local citizens or making advertisements for the project.

4. Formalized institutional channels for citizen participation and community mobilization

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☐ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

Both Stellenbosch Local Municipality and the City of Cape Town run Integrated Development Planning processes, which is the main form of interaction between residents and local authorities. In South Africa, Integrated Development Plans (IDPs) are strategic documents that outline a municipality's development priorities, goals, and strategies over a five-year period. The IDP process is mandated by the Local Government: Municipal Systems Act (Act 32 of 2000) and serves as a framework for guiding local government planning and decision-making.

In Stellenbosch and Cape Town, the IDP processes follow a similar structure but may differ in implementation details. Both municipalities typically engage in a series of steps to develop their IDPs which includes:

a) Needs Assessment and Stakeholder Engagement: The municipality conducts a comprehensive needs assessment to identify key development priorities and challenges within the community. This process often involves engaging with various stakeholders, including residents, community organizations, businesses, and government departments, to gather input and ensure that the IDP reflects the needs and aspirations of the community.

b) Drafting the IDP: Based on the needs assessment and stakeholder input, the municipality drafts the IDP document, outlining strategic objectives, priority projects, and resource allocations for the coming years. The IDP typically covers various sectors, including infrastructure, service delivery, economic development, social services, and environmental sustainability.

c) Public Participation: Both Stellenbosch and Cape Town provide formal channels for citizen participation in the IDP process. This may include public hearings, community workshops, surveys, online platforms, and citizen advisory committees to ward councillors. These mechanisms allow residents to provide feedback on the draft IDP, raise concerns, suggest priorities, and participate in decision-making processes.

d) Adoption and Implementation: After considering public input, the municipality finalizes the IDP and submits it to the municipal council for approval. Once approved, the IDP becomes the municipality's guiding document for development planning and budget allocation over the specified period. Implementation of the IDP involves the execution of projects, programs, and initiatives outlined in the plan, as well as regular monitoring and evaluation to track progress and adjust priorities as needed.

Overall, both Stellenbosch and Cape Town have formal channels for citizen participation in the IDP process, ensuring that the development priorities and strategies outlined in the plan align with the needs and aspirations of the local communities. These mechanisms contribute to promoting transparency, accountability, and inclusive governance at the local level. During this process, issues such as river health and water scarcity may be discussed with the municipality, and funds requested to address such issues.

5. Mechanism for ensuring top-down government and bottom-up social accountability

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☒ Medium confidence	☒ Documents
☒ 0.66	☐ High confidence	☒ Observations
☐ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The Department of Water and Sanitation is mandated to report on Sustainable Development Goal 6 (SDG 6) at the national level. The emphasis on SDGs is underscored by the department's commitment to reporting on a national scale, highlighting the importance of water resource management in the broader context of sustainable development. This commitment is reflected in presentations, where SDGs are prominently featured, reinforcing the imperative of aligning project outcomes with national and international sustainability goals.

The "Be Resilient" project aligns with formal structures established by the National Water Act, including catchment management agencies and forums such as estuary management forums. These structures mandate periodic reporting and collaboration, ensuring that the project's activities are integrated into larger water resource management initiatives at the national level. Notably, the RAMSAR convention and the National Water and Sanitation Master Plan serve as integral components in this collaborative framework.

The project engages in regular reporting, both nationally and at the provincial level, with Western Cape Province's Department of Agriculture (DADP) being a key partner. The submission of reports four times a year to the provincial department indicates a structured approach to accountability, embedding the "Be Resilient" project within the broader initiatives of the Western Cape Province.

The project acknowledges the importance of community engagement and social accountability. Insights from project participants reveal a desire for ongoing interaction, not just as research participants but as informed stakeholders. The need for transparent reporting is emphasized, as participants express a desire to access project reports. This highlights the importance of maintaining an open channel for information dissemination and feedback.

While individual community members express a desire for feedback and knowledge sharing, there are challenges in achieving this at the community level. Factors such as the provision of food at meetings

emerge as an incentive for attendance, indicating that mechanisms for engagement need to be carefully tailored to community preferences and expectations. The lack of leadership groups in certain areas, such as Khayamandi, is identified as a potential hindrance to the project's success, suggesting that involving community leaders could enhance effectiveness.

The importance of informal channels for feedback and knowledge sharing is acknowledged. Practical approaches, such as taking a mobile trailer to the river and utilizing word of mouth instead of formal advertising, indicate an understanding of the local context. Feedback occurs during direct engagement with the community, fostering a more accessible and community-centered approach.

UNESCO ROSA is recognized for their instrumental support, offering assistance in invoicing, funding, and report writing. This highlights the significance of institutional support in ensuring the smooth implementation of the project.

In conclusion, the "Be Resilient" project employs a multifaceted approach to accountability, addressing both top-down government reporting and bottom-up social accountability. The integration of formal reporting structures, community preferences, and adaptive strategies for engagement showcases the project's commitment to achieving sustainable water resource management through transparent, accountable, and inclusive practices.

These accountability mechanisms, although significant, have not supported collaboration because interviews with CS expressed concerns regarding the delay in receiving feedback and evaluation outcomes. It is important for results of evaluation outcomes and future project planning to be disseminated to all project levels.

6. Strategic agenda-setting by means of translation

QCA score:
☐ 0
☐ 0.33
☒ 0.66
☐ 1

Scoring confidence:
☐ Low confidence
☐ Medium confidence
☒ High confidence

Data sources:
☒ Interviews
☒ Documents
☒ Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The project employs a strategic agenda-setting approach, particularly during the start-up phase, where the focus is on addressing fault impacts concerning water quality and quantity. One of the significant challenges lies in effectively communicating the implications of climate change to communities. The question of how to convey the importance of this issue becomes central to the strategic translation of complex environmental concerns. The importance of SDG 6 has loosely been explained to project participants.

The project recognizes that community engagement has traditionally been more direct in rural areas, where tangible impacts, especially on farmers, are readily observable. In low-income settings, water rate bills have served as key engagement tools. Understanding the context of community dynamics and the necessity for direct, tangible impacts becomes pivotal in shaping the strategic agenda.

The Western Cape has experienced both extreme drought and flooding within a span of fewer than five years, marking record occurrences. The visibility of these events heightens awareness within the community, providing a unique opportunity for strategic agenda-setting. The project capitalizes on the tangible impacts that people witness, emphasizing the interconnectedness of water resource management with these environmental extremes.

Acknowledging the pitfalls in past government communication, especially during the "Day Zero" crisis in the Western Cape in 2018, the project emphasizes the need for precise messaging. Despite current reservoir levels, the project underscores the finite nature of surface water. The translation effort extends beyond immediate challenges to long-term considerations, urging communities to explore alternative water sources such as reused or treated wastewater and desalination. The latter requires a nuanced understanding of its implications, particularly in terms of increased costs.

The strategic agenda-setting goes beyond water quantity and quality concerns. It extends to emphasize the critical importance of managing the ecosystem. Recognizing that the ecosystem provides essential services at no cost, the project positions environmental care as a central tenet. Addressing issues such as illegal dumping and water pollution becomes integral to the holistic approach advocated by the project.

The project recognizes the influential role it plays within the community, serving as role models who are looked up to by community members. Leveraging this influence, the project encourages community members, especially children facing limited opportunities, to actively participate through volunteering. This approach aligns with the overarching goal of fostering a sense of environmental responsibility and community ownership.

Significance of this governance factor has been established as reference is made to SDGs in UNESCO and CWBR case, progress and evaluation reports. In addition, there is evidence that the SDGs have been actively adapted to local contexts by emphasizing the local problem: the lack of availability of clean and usable surface water for drinking, cleaning and recreational activities. However, no evidence suggests that the translation of the SDGs to local problems has so far supported the collaborative problem-solving processes of the project.

7. Construction of narratives about successful multi-actor collaboration

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☐ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The project presents a narrative of successful multi-actor collaboration, with key contributors from the Department of Water and Sanitation (DWS), Cape Nature, and evolving engagement with municipalities. The construction of this narrative reflects the adaptability, teamwork, and knowledge-sharing that underpin the project's success.

The Department of Water and Sanitation (DWS) emerges as a central actor, particularly within the Western Cape Regional Office. While the engagement is more localized, the collaboration extends to provincial levels. The project underscores the regional focus of DWS involvement, recognizing the significance of localized expertise in addressing water challenges.

Collaboration with CapeNature signifies the integration of environmental stewardship into the project's objectives, acknowledging the role of natural ecosystems in water resilience.

While municipalities are currently less involved, the project outlines plans for increased engagement in future phases. This phased approach aligns with the adaptive nature of the project, recognizing the necessity of involving diverse stakeholders at different stages.

The project's multi-community involvement necessitates adaptive engagement strategies. The locations for engagements vary, ranging from homes and churches to sports fields. The adaptive nature is also evident in the provision of hampers and food, showcasing a contextualized approach tailored to the specific needs of each community. UNESCO's non-prescriptive stance allows for flexible and adaptive communication strategies, acknowledging the diversity of community contexts.

The narrative constructed by the project underscores the interdependence and teamwork among participants. The project emphasizes that without collaboration, the undertaking would be incomplete and this was unanimously supported by all interviewees. The team's collective effort leverages diverse talents and knowledge, recognizing that individual efforts would yield limited outcomes. Knowledge and information sharing emerge as foundational elements in the success of multi-actor collaboration.

8. Building or harnessing institutional platforms and arenas

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The ability to conduct meetings virtually has streamlined communication, making it more accessible and manageable for participants who attended the meetings online, marking a significant departure from in-person gatherings.

The use of informal communication channels, such as WhatsApp groups, reflects a more relaxed and direct means of interaction.

On community level, communication within the project is primarily verbal, reflecting a preference for direct interaction over digital platforms. This approach aligns with the context of collaborative efforts taking place in community halls, where police assistance may be necessary during educational sessions on maintaining river cleanliness. While the "Be Resilient" project does not evoke feelings of insecurity, the acknowledgment of potential safety concerns in other initiatives underscores the importance of supportive environments in collaborative endeavors.

All of the above platforms and arenas are used systematically in the project, and it has supported the collaborative process of the project.

9. Provision of access to blended financing

QCA score:	Scoring confidence:	Data sources:
☒ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☐ Documents
☐ 0.66	☒ High confidence	☐ Observations
☐ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

All project funding was provided by The Government of Flanders, equating to ZAR2million.

10. The capacity to leverage support from authorities to enable local collaboration

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☐ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The "Be Resilient" project demonstrates a significant capacity to leverage support from various authorities, primarily from the Department of Water and Sanitation (DWS) and CapeNature. At the provincial level, both entities have been instrumental in supporting the project, contributing to training initiatives and providing valuable insights for the CS protocol design. The collaboration extends to practical aspects, such as inputs on the app and assistance in filling monitoring gaps by offering boots on the ground support. Despite operating at a provincial level, the national support from the Department of Forestry, Fisheries, and the Environment (DFFE) has been affirming, with positive feedback on the project's progress, even if practical guidance hasn't been explicitly provided.

The collaboration extends to municipal involvement, with the project actively engaging municipal personnel for support. Ward councilors, emerges as a crucial link in facilitating communication, organizing meetings, securing venues, and disseminating information using a loud hailer. Municipal assistance goes beyond mere facilitation, as they contribute valuable resources, such as tractors, for cleaning areas that the community may find challenging. The responsiveness of the municipality in addressing safety issues, exemplified by the prompt dispatch of a tractor upon request, highlights the effectiveness of this collaboration.

The project's personalized approach to municipal engagement, with direct contact with individuals rather than relying on formal channels like call centers, demonstrates an intimate understanding of the local landscape. Leveraging personal connections within the municipality, combined with the use of visual aids like photographs to pinpoint areas requiring attention, streamlines the collaborative process and enhances the project's impact.

The active involvement of a ward committee member in Idas Valley, further reinforces the collaborative ethos. His role, almost synonymous with that of a councilor, exemplifies the depth of engagement within the community, showcasing a collaborative effort that transcends traditional bureaucratic boundaries.

11. Inclusion and empowerment of relevant and affected actors

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☒ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☐ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The project has consciously approached its initial phases with a deliberate focus on understanding fault impacts, strategically omitting certain stakeholders such as farm managers, businesses, local authorities, and the private sector. This intentional exclusion was by design, aimed at prioritizing the voices and perspectives originating directly from the community and individuals on the ground. The emphasis has been on fostering a bottom-up approach, ensuring that the community plays a central role in shaping the project's trajectory.

The decision to defer the involvement of certain external actors, including ward councilors, until later phases aligns with the project's commitment to community-driven decision-making. Attempts were made with ward councilors in earlier stages, but it was observed that, even though they assist greatly with arrangements for the meetings, their presence tended to dominate the discourse, potentially overshadowing the authentic voices of the community members. The project team recognised the importance of creating a space where community voices could be heard without external influence, fostering a sense of ownership and empowerment.

The inclusive measures taken during meetings further underline the commitment to ensuring that all participants actively engage in the collaborative process. The challenge of disengagement and closed participation, as observed in some instances, has been addressed by implementing strategies like placing cellphones in a bucket. This practice aims to minimize distractions, fostering an environment where attention is directed towards the collaborative dialogue. CWBRs role in blending diverse groups, encompassing various races, languages, and areas, has played a pivotal role in creating an inclusive atmosphere where individual opinions are valued and heard.

The project's success in bringing together individuals with distinct backgrounds and perspectives is evident in the collaborative spirit described during meetings. Despite initial challenges of disengagement, the project team has worked effectively to ensure that all participants feel empowered to contribute. The emphasis on community-driven decision-making, coupled with tangible actions to mitigate potential disruptions during meetings, reflects a commitment to inclusion and empowerment.

Moving forward, as the project enters its next phase, the intentional inclusion of farm managers, businesses, local authorities, and the private sector signifies a strategic evolution. The insights gained from the community-driven approach will now be integrated into the broader collaboration, fostering a more comprehensive and inclusive decision-making process. The aim is to leverage the support garnered from the community from the outset, using it as a foundation to collaboratively develop feasible and affordable plans for sustainable initiatives. This approach ensures that the inclusion and empowerment of relevant and affected actors remain central to the project's ethos.

12. Clarification of interdependence vis-à-vis common problem and joint vision

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

Initially, there was a lack of interdependence among the communities involved in the project. Each community had its separate leadership and faced distinct challenges. CWBR noticed this lack of interdependence and highlighted it as a project risk. To address this risk, CWBR orchestrated a transformative experience during a river exploration, guiding Citizen Scientists through the journey of the Eerste River from its source to the sea. Through this process a shift occurred whereby CS became aware of their connection through the river. The growing realization of this interdependence is evident in the sadness expressed by Citizen Scientists when they don't see each other. There is now a shared understanding of the physical connection forged through this river and the efforts made by the facilitator has supported collaboration in the project.

Commonalities in adaptation options across communities have emerged. Questions arose regarding whether initiatives, such as a recycling project, should be localized or designed for the broader river, potentially impacting more people. The project revealed that many individuals were unaware of the river's starting and ending points, but Citizen Scientists have since familiarized themselves with the entire course from source to endpoint.

Cultural and language differences initially posed challenges, leading to the creation of more satellite units within their own communities. However, the design by CWBR facilitated the evolution of Citizen Scientists into a cohesive team, emphasizing teamwork through team-building exercises, as detailed in reports.

While community meetings remain separate, progress documents outline steps taken to foster collaboration and understanding. The engagement with the SDGs reflects a desire to learn more about global initiatives and connect with broader issues. The collaborative efforts extended to partnerships with communities such as Faure, exemplifying a joint commitment to address shared challenges in Stellenbosch and beyond.

13. Trust-building and conflict mediation

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The emphasis on trust-building among CS groups from different communities has been a foundational aspect of the project since its inception. Trust-building and conflict mediation are interconnected systems and processes that are integral to the success of this case study. One complements the other, creating an environment conducive to collaboration and shared objectives.

The potential for upscaling impacts exists when everyone collaborates effectively. The initial challenges included a language barrier among CS, with tensions arising between Xhosa and Afrikaans speakers. CWBR played a crucial role in addressing and diffusing tension by facilitating open dialogue. Establishing a code of conduct was pivotal; groups co-created a set of rules, outlining expectations from both CS and CWBR. This collaborative effort empowered individuals to address rule violations collectively, reinforcing a sense of ownership.

The project successfully navigated these challenges, fostering a cohesive and collaborative team. CWBRs leadership style, characterized by leading by example and encouraging independent thinking, contributed to a positive working environment. The freedom to ask questions, open communication channels, and the absence of conflict within the community underscored the effectiveness of trust-building measures.

Despite uncertainties about the project's future, there is a collective desire to learn more and a willingness to participate in future phases. This positive outlook highlights the resilience of the trust-building and conflict mediation mechanisms employed throughout the project.

14. Use of experimental tools for innovation

QCA score:
☐ 0
☐ 0.33
☐ 0.66
☒ 1

Scoring confidence:
☐ Low confidence
☐ Medium confidence
☒ High confidence

Data sources:
☒ Interviews
☒ Documents
☒ Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The adoption of the Kartoza app for monitoring and data collection represents a deliberate choice to harness technological platforms and has played a crucial role in enhancing the efficiency and innovation of the project. With a considerable number of meetings taking place online, including steering and feedback sessions, the app has facilitated global collaboration among various stakeholders.

The Kartoza app serves as a monitoring tool for CS to collect water quality data. Despite initial challenges during the first round, ongoing development aims to address these issues and improve functionality. The app minimizes the scope for human error and simplifies the backend process of collecting and submitting data to the relevant platforms. This stands in contrast to manual data entry, which is not only time-consuming but also prone to inaccuracies. However, challenges have been identified, such as technical complexities and a lack of user-friendliness, particularly for individuals with lower levels of education.

An important consideration is the diverse educational backgrounds of participants, with some having as low as a Grade 4 education level. This underscores the need for tools that are accessible and user-friendly for a broad spectrum of users. The reliance on WhatsApp for certain communications, such as weather warnings during floods, highlights the adaptability of the project to different communication platforms based on participant preferences and accessibility.

Looking ahead, the next phases of the project will introduce new tools and adaptations. These innovations will undergo pilot testing and trials before full-scale implementation, ensuring their feasibility and effectiveness. The first phase of the CS initiative itself served as a trial, evaluating the distribution of equipment and the effectiveness of data collection methods through platforms like WhatsApp. This iterative and experimental approach aligns with the project's commitment to continuous improvement and adaptation. The use of these experimental tools have enhanced and supported collaboration through all project levels, from CS to project leaders.

15. Ongoing critical self-reflection and learning (i.e., process and/or developmental evaluation):

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☒ Documents
☒ 0.66	☒ High confidence	☒ Observations
☐ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

The process of ongoing critical self-reflection and learning within the project is notably evident through the regular submission of reports, each of which serves as an evaluation in itself. These reports conclude with a dedicated evaluation section, emphasizing the project's commitment to introspection and improvement.

The evolution of the project from phase 1 to phase 2 underscores the developmental approach, with each phase building upon the insights and feedback from the preceding one. This iterative process is further supported by partner steering meetings and check-in/reflection sessions, fostering continuous learning and adaptation.

It is noteworthy that the formal evaluation of the project is yet to take place. Despite the absence of a comprehensive evaluation, the project has incorporated feedback mechanisms through various channels, including external reviews such as the one conducted by UNESCO.

However, there are expressed concerns regarding the delay in receiving feedback and evaluation outcomes. Participants from Franschhoek mention a promise to provide updates after a meeting in February 2023, yet no communication has been received since. The importance of feedback and education is emphasized, particularly in raising awareness about the environmental issues faced by the communities.

The sentiment that more information and knowledge sharing are needed is echoed in discussions about the project's impact. There is a perception that the communities might not have sufficient knowledge about how certain aspects of the project that can contribute to the improvement of riverbanks. This knowledge gap is seen as potentially hindering effective community engagement and service delivery.

While the project actively engages in self-reflection through regular reporting, the formal evaluation process is still pending. The feedback loop, essential for improvement and adaptation, is crucial for addressing community concerns and enhancing the overall impact of the project.

16. Exercise of facilitative leadership:

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Interviews
☐ 0.33	☐ Medium confidence	☐ Documents
☐ 0.66	☒ High confidence	☒ Observations
☒ 1		

Please elaborate on the reasoning behind your scoring for this governance factor:

Facilitative Leadership in the context of the discussed project has been a defining factor in its success, fostering collaboration, trust-building, and effective community engagement. The leadership approach, led by CWBR, is characterized by a facilitative style that empowers and involves community members in decision-making processes. This leadership style is evident in several key aspects:

a) Empowerment and Inclusivity: Facilitative leadership empowers community members by valuing their opinions and input. CWBRs leadership approach ensures that each participant has a voice, creating an inclusive environment where diverse perspectives are acknowledged and respected. The establishment of a code of conduct and a collaborative rule-setting process illustrates a commitment to inclusivity and shared ownership of the project.

b) Language and Cultural Sensitivity: Addressing initial challenges related to language barriers showcases a facilitative approach. CWBRs ability to recognize and address linguistic and cultural differences, such as the discomfort caused by language preferences, highlights the adaptability of the leadership style. Through open dialogue and understanding, these barriers were overcome, fostering a more cohesive and collaborative community.

c) Trust-building and Conflict Resolution: Trust-building is a cornerstone of facilitative leadership, as demonstrated by efforts to build trust between CS groups from different communities. The facilitative leadership style actively addresses conflicts, ensuring that each participant feels heard and respected. The establishment of trust is crucial for effective collaboration and information-sharing, ultimately contributing to the project's success.

By valuing diverse perspectives, fostering inclusivity, and building trust among participants, facilitative leadership creates a conducive environment for collaboration and collective decision-making. This approach enables community members to actively engage in the project, share their expertise, and work together towards common goals, ultimately enhancing the project's success and sustainability.

Outcome variable: Successfully co-created green transitions

The outcome variable 'co-created green transitions' will be scored in two parts. First, 'co-creation' will be scored based on an assessment of whether the participants in the initiative, project or process engaged in collaborative problem-solving that fostered creative ideas and innovative solutions (data will consist of survey data combined with interviews and documents). Next, 'green transitions' will be scored based on an assessment of whether the initiative, project or process has fulfilled or is expected to fulfil its green goals, ambitions and aspirations (data will consist of survey data combined with interviews and internal and/or external evaluation reports, including scientific publications).

The scoring of this variable is done in two parts:

1. *Is the developed solution based on collaborative problem-solving spurring creativity and innovative solutions?*
2. *Does the developed solution engender a green transition?*

This scoring should be conducted based on both the survey and complementary green outcome evaluations. Please consult Sections 4.4 and 6.10 in the Research Protocol for more details.

1. Is the developed solution based on co-creation?

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Survey
☐ 0.33	☐ Medium confidence	☒ Interviews
☐ 0.66	☒ High confidence	☐ Documents
☒ 1		☐ Observations

Please elaborate on the reasoning behind your scoring for this part of the governance factor, including the data sources used for the scoring.

A series of survey questions focus on the presence of collaborative problem-solving (1), the fostering of creative and innovative solutions (2-6), the support for process, outcomes and the level of engagement (7-12), and the attainment of goals that are robust and serve to enhance sustainability (13-15).

If possible, please insert your survey responses in the table below (in % for each response), including the mean/average % for each survey item.

n = 12	Strong. dis.	Dis.	Slight. dis.	Neither agr/dis	Slight. agree	Agree	Strong. agree	Mean score
1. Problem-solving mobilized different experiences, and/or ideas and/or forms of knowledge to develop new perspectives	-	-	-	-	17% (n=2)	42% (n=5)	42% (n=5)	2.25
2. Through the collaborative problem-solving process, different experiences and/or ideas and/or forms of knowledge have been mobilized to search for unconventional solutions	-	-	-	8% (n=1)	17% (n=2)	58% (n=7)	17% (n=2)	1.83
3. The collaborative problem-solving process mobilized different experiences, and/or ideas and/or forms of knowledge to search for solutions that go beyond standard/text-book solutions	-	-	-	-	42% (n=5)	58% (n=7)	-	1.58

Item								Mean
4. The co-created solution breaks with established practices	-	-	-	8% (n=1)	17% (n=2)	67% (n=8)	8% (n=1)	1.75
5. The co-created solution disrupts conventional wisdom	-	-	-	-	8% (n=1)	75% (n=9)	17% (n=2)	2.08
6. The co-created solution offers new ideas to address the green transition problem	-	-	-	-	58% (n=7)	42% (n=5)	-	1.42
7. I'm supportive of the co-created solution	-	-	-	-	25% (n=3)	33% (n=4)	42% (n=5)	2.17
8. I'm content with the overall collaborative process of the project	-	-	-	-	33% (n=4)	17% (n=2)	50% (n=6)	2.17
9. I feel the multi-actor collaboration process was a prerequisite for the success of the project	-	-	-	-	33% (n=4)	42% (n=5)	25% (n=3)	1.92
10. I'm satisfied by the results of the co-creation effort in terms of expected impact on the welfare of the community	-	-	-	8% (n=1)	8% (n=1)	42% (n=5)	42% (n=5)	2.17
11. The collaborative interaction in the project has led to an innovative solution	-	-	-	8% (n=1)	58% (n=7)	17% (n=2)	17% (n=2)	1.42
12. The actors involved in the project are engaged in collaborative interaction that stimulated creative problem-solving	-	-	-	-	-	42% (n=5)	58% (n=7)	2.58
13. The co-created solution meets the proposed goals of the project	-	-	-	-	25% (n=3)	17% (n=2)	58% (n=7)	2.33
14. The co-created solution will be durable and robust in the long run	-	-	42% (n=5)	8% (n=1)	25% (n=3)	17% (n=2)	8% (n=1)	0.42
15. The co-created solution is expected to significantly improve sustainability for the whole community	-	-	58% (n=7)	8% (n=1)	-	8% (n=1)	25% (n=3)	-0.33

2. Does the developed solution engender a green transition?

QCA score:	Scoring confidence:	Data sources:
☐ 0	☐ Low confidence	☒ Survey
☐ 0.33	☒ Medium confidence	☒ Interviews
☐ 0.66	☐ High confidence	☐ Documents
☒ 1		☐ Observations

Please elaborate on the reasoning behind your scoring for this part of the governance factor, including the data sources used for the scoring.

A series of **survey questions** focus on whether the project has produced or is expected to produce a green transition aiming to avoid a worsening of the status quo, maintain the status quo or improve the status quo.

The answers show that most respondents (83%) believe that the Be Resilient project did, in fact, produce some form of green solution. Only one respondent indicated that they think that no green transition solutions were produced by the project, and one indicated that they were unsure whether a solution was produced. From the survey results it is clear that respondents feel that the green transition solutions produced will either avoid the worsening of the current status quo (67%), or, more likely, that it would lead to the improvement of the current status quo (83%). Only 25% of respondents think that no change will take place and that the current status quo will remain. This indicates that there is an overall feeling amongst participants that the project is impactful.

If possible, please insert your survey responses in the table below (in % for each response).

1. The project: (n=12)	Yes	No	Don't know
…did not produce any green transition solution	8% (n=1)	83% (n=10)	8% (n=1)
…is expected to produce/has produced a green transition solution aiming to avoid a worsening in the status quo	67% (n=8)	17% (n=2)	17% (n=2)
…is expected to produce/has produced a green transition solution aiming to maintain the status quo	25% (n=3)	58% (n=7)	17% (n=2)
…is expected to produce/has produced a green transition solution aiming to improve the status quo	83% (n=10)	8% (n=1)	8% (n=1)

Please list all the informants you have interviewed for the case study (list project role + interview date):

The following informants were interviewed:

CEO: Cape Winelands Biosphere Reserve. 5 September 2023

Administration: Cape Winelands Biosphere Reserve. 5 September 2023

Youth Development and Education. Cape Winelands Biosphere Reserve. 5 September 2023.

Citizen Science Coordinator. Cape Winelands Biosphere Reserve. 5 September 2023

Project Manager: Cape Winelands Biosphere Reserve. 17 November 2023

Community Participant: Khayamandi. 21 November 2023

Community Participant: Khayamandi. 21 November 2023

Community Participant: Khayamandi. 21 November 2023

Community Participant: Khayamandi. 21 November 2023

Citizen Scientist: Idas Valley. 21 November 2023

Citizen Scientist: Idas Valley. 21 November 2023

Citizen Scientist: Cloetesville. 21 November 2023

Citizen Scientist: Cloetesville. 21 November 2023

Citizen Scientist: Cloetesville. 21 November 2023

Citizen Scientist: Jonkershoek. 28 November 2023

Citizen Scientist: Faure. 28 November 2023

Project Manager: UNESCO. 14 February 2023

Please list all the observations you have made (type of meeting/workshop/etc. + observation date):

UNESCO Regional Forum meeting, 01 November 2023

CWBR exhibit, Plankenbrug River, 02 November 2023

Please list all the documents you have analyzed (document name + source + year):

CWBR: Climate Risk Informed Decision Analysis Phase I Report (no date)

CWBR: Climate Risk Informed Decision Analysis Phase II Report (Draft Version 1) (no date)

CWBR: Be Resilient Citizen Science Programme Implementation Progress Report (no date)

CWBR: Community Engagement Workshops write-up (no date)

UNESCO Be-Resilient South Africa Project Newsletter January-June 2023

CWBR: Towards CRIDA lite (no date)

Please note the response rate for the survey/measurement of outcome variable:

71%