Report of the Second Swartkops Catchment Workshop

Workshop Date: 21 July 2022

SDG-pathfinding project

Authors: Aphiwe Magwala and Chennai Murata
Reviewer: Nelson Odume

Foreword

Summary: SDG-pathfinding (*Co-creating pathways for sustainable development in Africa*) is a transdisciplinary research project (2021-2023) aims at developing tools and capacities to support the localization of the SDG agenda in African countries using participatory bottom-up approaches. We have brought together natural and social scientists from three leading institutions, Rhodes University (South Africa), Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (France), and The International Institute for Applied System Analysis (Austria), along with a leading local NGO, Groupe d'Action et d'Initiative pour un développement Alternatif (GAIA) to work collaboratively with a broad network of stakeholders including local policy makers, NGOs, grassroots, and private sector from the Fimela district (Senegal) and the Swarzkopt basin (South Africa) in order to: 1) Develop and test an innovative tools to lift local capacities for framing complex sustainability challenges using a system thinking approach and explore adaptative pathways to meet the SDG agenda at local level in these two case studies, 2) Foster multi-stakeholder collaboration to promote social learning and innovation on how to localize the SDGs, and, 3) Support the institutionalization of the sustainability agenda beyond the lifetime of the project. The project is a not-for-profit research effort and is part of the Belmont Forum initiative to support the development of international networks and collaborations to support the development of transdisciplinary research to develop and implement the sustainability agenda.

More information: https://iiasa.ac.at/projects/sdg-pathfinding-co-creating-pathways-for-sustainable-development-in-africa

Contact: Project Coordinator: Dr. Bárbara Anna Willaarts (IIASA)

Funding: This work was conducted as part of the Belmont Forum "*Transdisciplinary Research for Pathways to Sustainability"* collaborative research action for which coordination was supported by the Austrian Science Fund (FWF) under the grant number 5356N to the International Institute for Applied Systems Analysis (IIASA). The French partner INRAE is funded by The French National Research Agency (ANR). Rhodes University receives funding from the National Research Foundation from South Africa (NRF) and GAIA from Future Earth. Any opinions, findings, and conclusions, or recommendations expressed in this material do not necessarily reflect the views of the funding organizations.

Table of Contents

Introduction

The United Nations Sustainable Development Goals (UN SDGs) provide a framework for achieving a balance among social, economic, and environmental needs. The UN SDGs were adopted in 2015 to provide guidance on how to ensure sustainability not only at national level but also at subnational level such as the Swartkops Catchment system. The key contribution of the SDGs is that they show that our livelihoods needs, including economic, social, environmental and technological are interconnected, and hence any strategies and means to achieve them should be designed in ways that they can appreciate and handle this integration in order to ensure sustainability (Mio, 2020). We adopted the SDGs framework in this project to inform how we implement key activities such as workshops and Living Labs. This report explains how the second project workshop was conducted. It built on the first workshop which is briefly described below, just to give context.

The first workshop under the SDG Pathfinding project was conducted in the Nelson Mandela Bay Metro, Swartkops Catchment on the 22nd of January 2022. It focused on Strategic Adaptive Management processes. Particularly, workshop activities included articulation of shared values of stakeholders, identification of sustainability challenges, as well as establishing a broader catchment management vision. The workshop process also included GIS participatory mapping which was aimed at mapping out ecosystem services in the catchment. A brief recap of the first workshop was given before the second workshop commenced.

The second workshop, which is the focus of this report, took place on the 21st of July 2022, in the Nelson Mandela Bay Metro. Just like the first workshop, the second workshop was guided by the SDG framework, but its focus was on system mapping of the current sustainability situation as well as mapping of the vision for the catchment. The primary tool used for this exercise was the pathway system mapping tool. Attended by a total of 37 participants, the workshop encompassed two parts, which were mapping the current situation of catchment management and articulating the future vision of the catchment using the system mapping toolkit.

System mapping is a technique that uses an online Miro Board System Mapping toolkit. This toolkit is a collaborative guide that helps in both making sense of complex sustainability challenges and identifying opportunities for systemic change. System mapping follows three important steps: framing, mapping, and reflecting on complex challenges. The system mapping tool was used to visually map the challenges and vision for the catchment.

Although the systems app is predominantly an online technique, in this workshop it was adapted for implementation in a physical setting through using cards with various entities, processes, and indicators (see Table 1). In the context of a systems mapping toolkit, these concepts are defined as follows:

a) entities are things with distinct and independent existence;
b) processes are series of activities, motions or operations leading to some result;
c) indicators are signs that show or suggest conditions or existence of something, and
d) trends suggest the direction of the processes or indicator, where improving, degrading, remaining constant or other forms of movement e.g., oscillatory etc

Table 1: Entities, processes and indicators applied within the STEEP-H framework

	Social	**Technology**	**Environment**	**Economy**	**Politics**	**History**
Entity	Cultural & spiritual sites	Green coastal protection	Ecosystem	Income	Transportation infrastructure	Historical spatial Apartheid planning
Process	Communication & raising awareness	Wastewater treatment	Biodiversity loss	Circular economy	Services	
Indicator	Water use efficiency	Flood protection	Pollution	GDP	Tourism	

The cards were then categorized according to the STEEP-H framework. The STEEP-H[1] framework was used to categorize these entities, indicators, and processes by breaking them down into the following five categories: social, technology, environment, economy, politics and governance, as well as history. The system mapping cards (see Fig 1) were color coded with each color representing the various STEEP-H categories. Red represented society, grey represented technology, green represented environment, orange for economy, purple for politics and governance and brown represented history.

[1] The STEEP-H framework had been used in the first workshop to both categorise challenges and define the catchment management vision.

Figure 1: The system mapping Cards

Swartkops Catchment System Mapping

System mapping was the key activity for this workshop. The mapping process was divided into two parts briefly explained below.

a) The first part was mapping of the current situation, as well as reflecting on both challenges and successes that stakeholders currently face in the Swartkops Catchment. This was done by using the color cards. In order to achieve this, participants were put into three groups, with each one provided with a map of the Swartkops Catchment. The groups were asked to identify challenges that they knew were taking place in the catchment and to place a color card on the portion of the map at which the challenge existed. In addition, participants were asked to place the trend[2] which that indicator, entity or process was undergoing. Once all groups had completed this task there was a brief report back session in which the groups shared the top challenges and successes they had identified. It must be noted that the sustainability challenges and successes were mapped and identified according to the STEEP-H framework.
b) The second step was to map a future vision for the catchment. This process was done in the same way as the previous task. Mapping the vision also involved placing the relevant trends. When the exercise was completed, the groups were asked to share their visions in plenary. Just like the first exercise, the vision for the catchment reflects the various dimensions of the STEEP-H

[2] Trends represent the manner an element follows, such as decreasing, increasing, stable, oscillating, sharp increases and decreases

framework. Out of the vision, flow strategic objectives or pathways for achieving the overarching vision. The objectives, which were clarified in the Living Labs, were then adopted to provide the strategic direction, and to identify actionable steps that can be taken by different stakeholders in pursuit of the vision. Tables 2 and 3 below summaries the outcomes of the system mapping activities of challenges and vision respectively for the Swartkops catchment.

Table 2: A summary of key outcome of the system mapping activity of the current situations in the Swartkops Catchment

Swartkops Catchement Challeges											
Society		**Technology**		**Environment**		**Economy**		**Politics & Governance**		**History**	
Communication and raising awareness	↙	Wastewater treatment	↙	Water quality	↙	Tourism	↙	Tourism infrastructure	↙	Historical Spatial apartheid planning	⇔
Drinking water availability	↙	Wastewater measurement infrastructure	↙	Biodiversity	↙	Local economy	↙	Infrastructure Damage	↗		
Culture and Spiritual Sites	↙	Ground water extraction	↙	Drought	↗	Estuary (bird sanctuaries)	↙	Employment rate	↙		
Unemployment Rate	↗	Power grid	↙	Climate Seasonality	↗	Motor manufacture and Assemble factories	⇔	Health care system capacity	↙		
Population Growth	↗	Flood protection Infrastructure	↙	Water level	↙	Income level	↙				
Energy demand	↗	Water Storage/ reservoir	↙	Pollution	↗	Energy Prices	↗				
Park, art ground, educational	↙	Underserviced Communities	↗	Water Contamination	↗	Food Prices	↗				
Vandalism	↗			Biological Pollution	↗	Agricultural Area	↙				
Crime	↗			Chemical Pollution	↗	Manufacturing	⇔				
Health Risk	↗			Habitat Degradation	↗	Port	⇔				
Food Security	↙			Heavy metal Pollution	↗						
School, Universities				Wetland	↙						
Water demand	↗			Saltwater intrusion (summer strand)	↗						
Informal Settlements	↗			Biodiversity loss in coastal area							
Energy Consumption	↗			Swartkop River and estuary	↙						
				Flood Plain	↙						
				Anthropogenic Pressure on wetland	↗						
				Fish sanctuary	↙						
				GHG emissions	↗						

Increase	Decline	Stable
↗	↙	⇔

Table 3: Table of outcomes for the future vision of the Swartkops Catchment

Swartkops Catchement Vision											
Society	**Trend**	**Technology**	**Trend**	**Environment**	**Trend**	**Economy**	**Trend**	**Politics & Governance**	**Trend**	**History**	**Trend**
Drinking water availability	↗	Organic agriculture	↗	Alien invasive plants		Energy price	↙	Tourism infrastructure	↗	Aloe community	↗
Water use efficiency	↗	Water measurement infrastructure	↗	Water quality	↗	Manufacturing	↗	Services	↗	Heritage and culture	↗
Parks, sport, art grounds, environment and education grounds	↗	Wastewater treatment	↗	Nature attraction	↗	Motor manufacturing and assembly	↗	Employment rate	↗		
Unemployment rate	↙	Wastewater recycling infrastructure	↗	Biodiversity	↗	Port		Government Structure	↗		
Water demand	↙	Canal irrigation	↗	Rainfall	↗	Circular economy	↗	Floodplain restoration and management	↗		
Quality of Life	↗	Green coastal protection infrastructure	↗	Flora (alien plants –removal-job creation)	↗	Income level	↗	Access to clean water	↗		
Schools, universities		Rainwater harvesting infrastructure	↗	Climate seasonality		Farmlands	↗	Healthcare System capacity	↗		
Cultural and spiritual sites	↗	Food Production	↗	Water level –drop		Agricultural area	↗				
Communication and raising awareness	↗	Water storage	↗	Environmental flow	↗	Fish and Seafood	↗				
Health Risk		Research centres	↗	Protected area	↗	Food prices	↙				
Crime	↙	Flood protection infrastructure	↗	Pollution (biological)		Tourism	↗				
Population Growth	⇔	Solid waste recycling infrastructure	↗	Urban green spaces	↗	Food Processing					
People with disability		Power Grid	↗	Railways	↗	Local economy	↗				
Outpatient Clinics	↗	Drought resistant crops	↗	Habitat degradation		Estuary (Bird Sanctuaries)	↗				
Food security	↗	Irrigation water storage	↗	Natural water purification	↗						
Water reuse	↗	Flood protection infrastructure	↗	Flood plain							
Fishing	↗	Drainage infrastructure	↗	Fish Sanctuary	↗						
Rain water harvesting	↗	Desalination	↗	Wetland and protection	↗						
Water Security	↗			Coast erosion							
Energy demand	↙			Nature Attraction	↗						
Energy efficiency improvement	↗			Water management	↗						
Health	↗			Grassland							
				Ecosystem							
				Rainfall	↗						
				GHG emissions							
				Beach nourishment	↗						

The paragraphs below briefly explain the challenges and visions identified by the three participant groups during the system mapping activities. Figure 2 and 3 below show the mapped current situation in, and future vision for the catchment respectively.

1. Social

The most prevalent social challenges and concerns identified by participants were largely similar across the three participant groups. They include increasing unemployment rate, increase in incidents of vandalism, lack of awareness and communication about water and the environment. Participants stated that unemployment was the reason why incidents of crime and vandalism were rising. They reported that lack of communication and awareness regarding to the dynamics taking place in the local water sector were largely due to the fact that there are no public social spaces such as parks, arts centers and educational grounds where local residents can meet and share knowledge through social conversations. Furthermore, participants reported that there was an increase in pollution in the catchment. The pollution has led to a decrease in cultural sites in the catchment. In addition, informal settlements are mushrooming in the catchment, including on ecologically sensitive areas such as flood-plains and just a few meters from water courses. This has also contributed to the ongoing water pollution challenges. Yet a more critical challenge is that there is a growing increase in water demand, which over the past years, has escalated leading to a water crisis in the catchment.

The mapped vision for the Swartkops Catchment painted a healthier and sustainable catchment, as participants envisioned having a lower and declining unemployment rate, which can also lead to a decline in incidents of crime and vandalism. This envisaged future included having increased water security, and an increase in rainwater harvesting facilities. Rainwater harvesting and storage practices will be implemented to ensure water security in the catchment. Last but not least, the catchment will have more clinics that will provide timeous and quality health services to local residents.

2. Technology

Technology plays a vital role in the sustainability of the catchment, especially technology that helps to enhance water quality and water *storage.* As such the concerns that were identified were: shortage of appropriate technologies *for inter alia*, wastewater treatment, ground water extraction, flood protection, water storage and reservoir construction. These challenges are compounded by a general shortage of wastewater infrastructure. All this negatively impact on both the quality of water and quantity of water that the catchment supplies. Most notably, this has led to a growing number of underserviced communities within the Swartkops Catchment. Progressively, this is breeding a social-political challenges in the form of service-delivery demonstrations/protests.

The vison reported by participants is a catchment with functional wastewater treatment infrastructure, flood protection, and increased water storage and reservoir capacities.

In addition, there will be increased coastal protection infrastructure as well as more research centers within the catchment.

3. Environment

The environment plays a vital role in all the lives (both non-human and human) and sustainability of the catchment system. Stakeholders identified several key environmental concerns in the Swartkops Catchment such a decrease in biodiversity. One key indicator of this is the decrease of flamingo and other bird species in the Summerstrand area. This is also linked to the increase in habitat degradation within this area and the decrease in the environmental quality of Swartkops Rivers and estuary systems. Another environmental challenge is the decrease in water levels because of an increase in drought events within the area. The most critical environmental concern is a rampant increase in pollution including, biological and chemical pollution. This is caused by, among others, uncontrolled dumping and the mushrooming of informal settlements along water courses. Moreover, lack of communication renders local residents unaware of appropriate strategies to prevent water pollution.

In light of these challenges, the vision of the catchment is a catchment with low levels of pollution, increased water levels through removal of alien plants from riparian zones, as well as increased number of green spaces and sanctuaries.

Figure 2: The mapped current situation

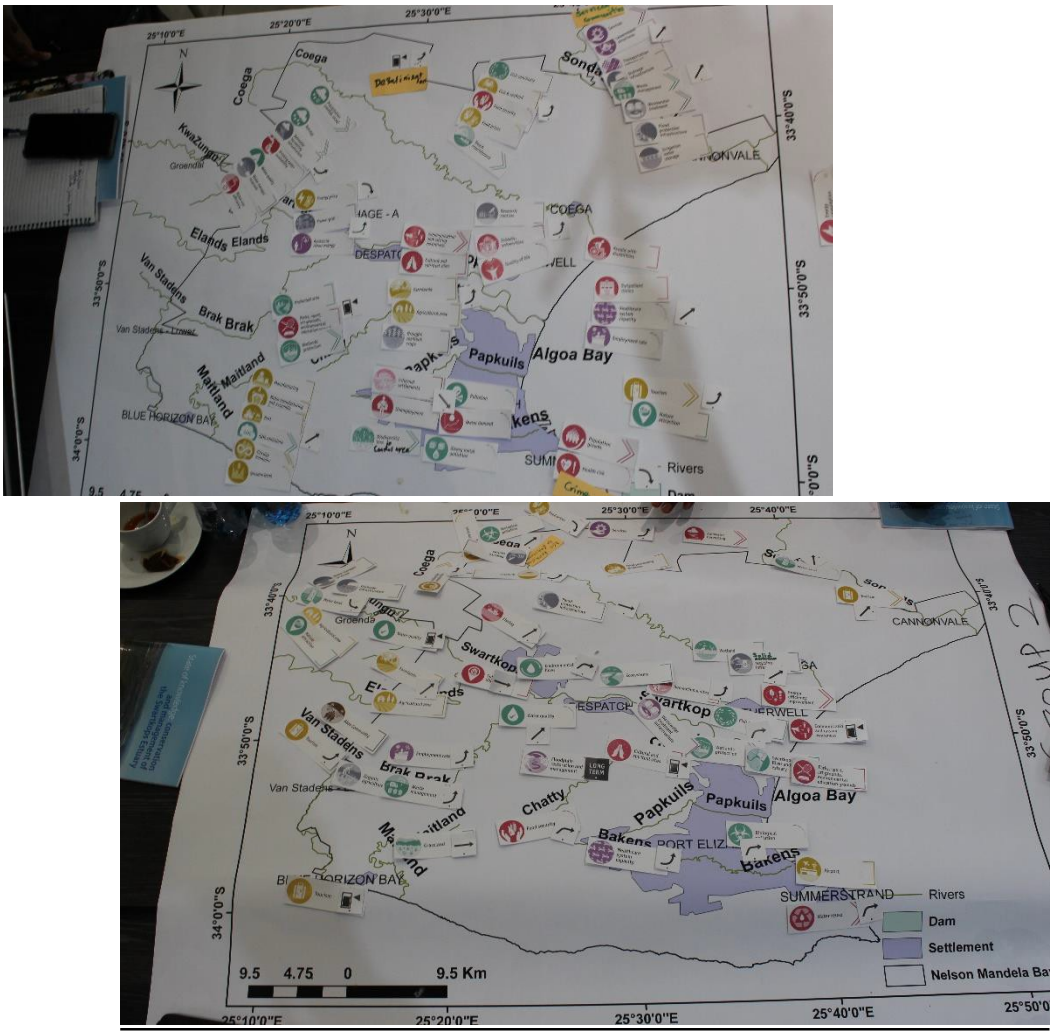


Figure 3. The mapped vision for the catchment.

4. Economy

The state of the economy directly affect the well-being, as well as sustainability of life in the catchment. The participants reported that the catchment was experiencing a weakening economy characterized by high food and energy prices, a high unemployment rate, as well as declining agricultural and tourism sectors.

Participants envisioned a future catchment with a healthy economy characterized by low prices of food and energy, a high employment rate, as well as buoyant tourism and agricultural sectors.

5. Politics and Governance

The key identified political and governance concerns were the increase in infrastructure damage related to lack of infrastructure maintenance, and replacement by relevant local government sectors. This has resulted in, among others, a sharp

decrease in health care capacity, and decrease in employment rate in the catchment.

Participants' vision of a future catchment is one with well-maintained infrastructure and adequate capacity to deliver services to its residents.

6. History

The legacies of apartheid spatial planning remain a key historical concern within this catchment. The vision was identified a catchment with an increasingly thriving and improving Aloes Community as well as an increased number of heritage and cultural sites. Figure 4 shows participants conducting system mapping.

Figure 4: Participants conducting system mapping

The section below provides a brief report of the inaugural Living Lab session.

Living Labs

The workshop was followed by an inaugural Swartkops Catchment Living Labs session. Living Labs are a social innovation, collaborative space/platforms for stakeholders from academia, communities, governments, NGOs and the broader civil society to experiment in a collaborative way for creating, prototyping, validating, and

testing of new technologies, services, products, and systems in real-life contexts (Lemine *et al.,* 2012). Essentially Living Labs encompass local innovation and activities started by citizens, companies, non-profit organizations and other stakeholders, out of a desire to improve the current situation (Hossain *et al.,* 2019). This session was held on the 22nd of July 2022 with a total of 25 stakeholders participating. Among others, the Living Lab session included a presentation that focused on the concept of Living Lab (Attached in this email) and making key decisions regarding how the Lab will operate going into the future.

In this session members of the Living Lab collaboratively established values (see Table 4 below) that will guide future activities and decision-making. Furthermore, a task team was established to work on establishing an action plan to address the challenges identified in the first SDG and Urban River Governance workshops held in the Nelson Mandela Bay Metro. Subsequently, the Living Lab team held a virtual meeting on the 4th of August and started to draft an action plan to be presented in the next Living Labs session. It was agreed that the second Living Labs session would be held on the 9th of September 2022.

Table 4: Values of the Swartkops Catchment Living Lab

Values		
Teamwork	Adaptiveness	Communication
Accountability	Responsibility	Dedication
Integrity	Innovation	Leadership
Mutual Respect	Communication	Trust

References

Hossain, M., Leminen, S. and Westerlund, M., 2019. A systematic review of living lab literature. *Journal of Cleaner Production*, *213*, pp.976-988.

Leminen, S., Westerlund, M. and Nyström, A.G., 2012. Living labs as open-innovation networks.

Mio, C., Panfilo, S. and Blundo, B., 2020. Sustainable development goals and the strategic role of business: A systematic literature review. *Business Strategy and the Environment*, *29*(8), pp.3220-3245.

Inaugural Living Lab meeting

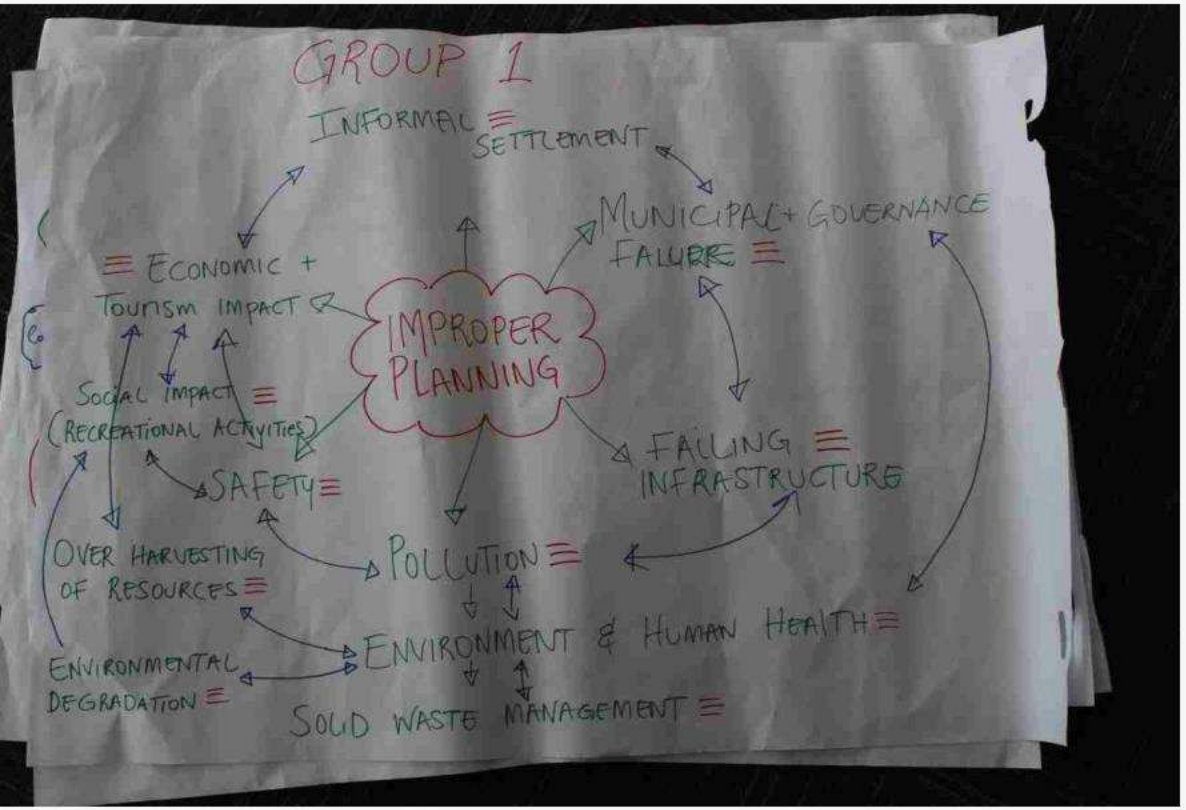
22 July 2022

UN Sustainable Development Goals

The sustainable development goals

- Complex
- Potentially intractable and wicked
- Unpredictable, multi- and cross-scale dynamics
- Multiple feedback loops –cascading effects
- Defile conventional wisdom and solutions

Local sustainability challenges



- Complex
- Poverty and unemployment (>50% of poor households depend on grant)
- Path-dependency and natural resource degradation (river and coastal resources – water quality, pollution etc)
- Cross-scale and cooperative governance challenges
- Crime and vandalism
- Systemic governance failure

- Key SDG challenges

STEEP-H

Social e.g. unemployment, crime.

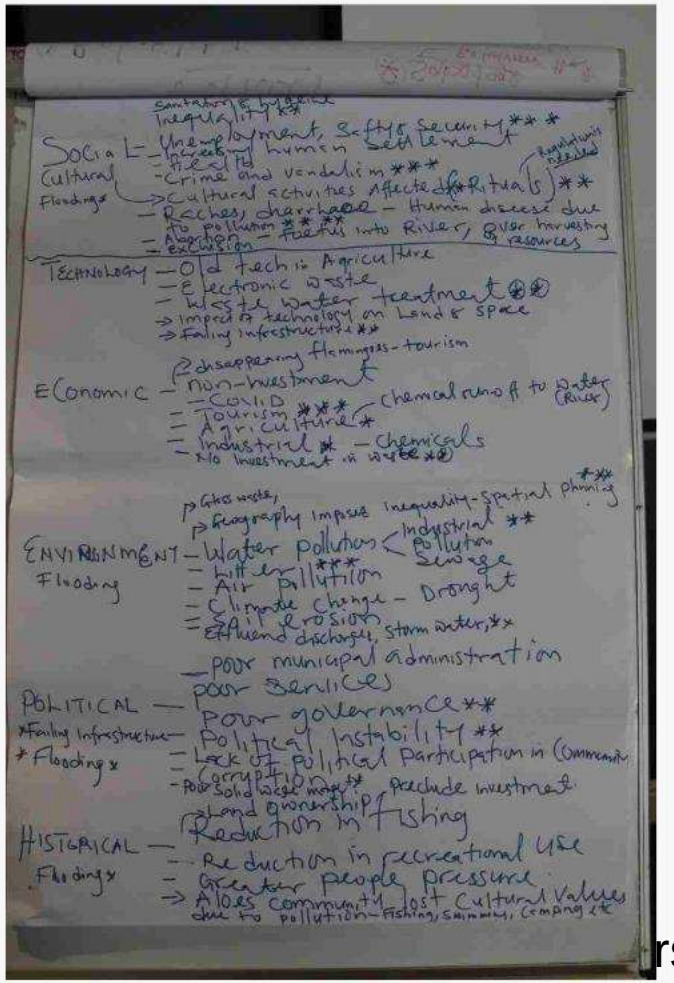
Technology i.e. old infrastructure

Environment i.e. Water Pollution

Economy loss of tourism opportunity

Political – political instability and systemic governance challenges

History - reduction in fishing.

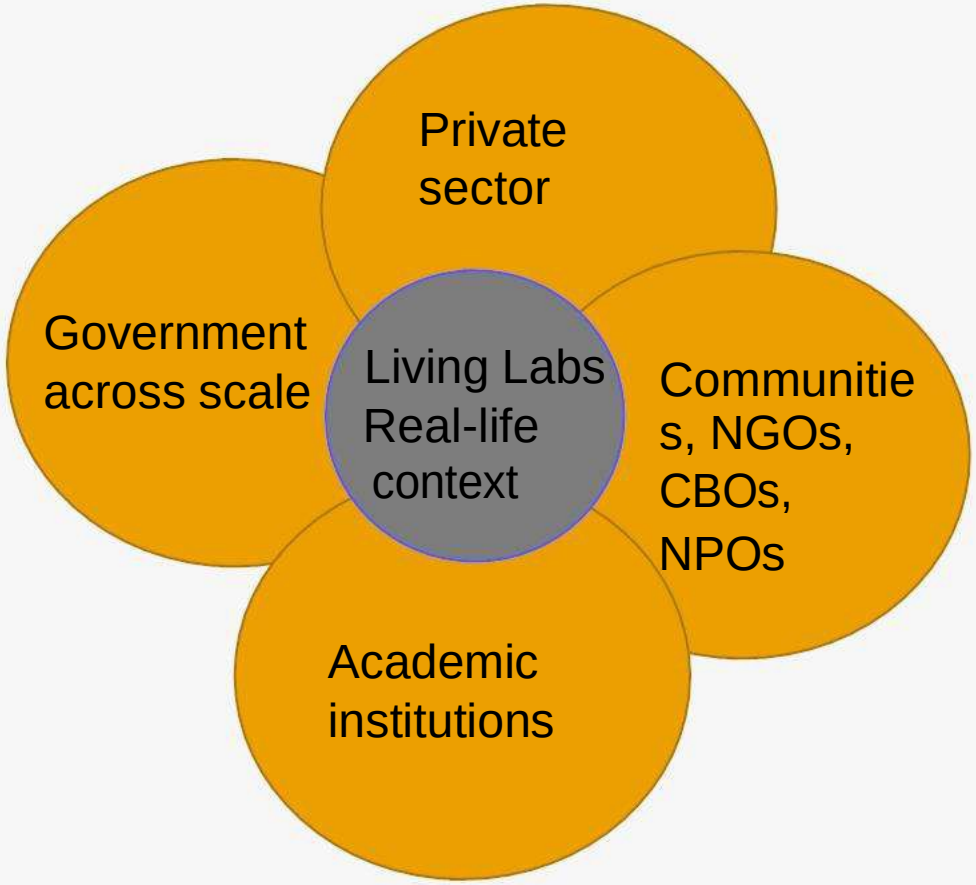


rs

Local sustainability challenges – innovation is required

- Social innovation is required to address the local sustainability challenges
- Bottom-up approach that feeds into top-down, and vice versa is required – cross-scale dynamic innovation
- May require the design of new, network-based institutions
- Draws on inclusive knowledge systems
- Diverse actor grouping

Local sustainability challenges – Living Labs as social innovation space



- Living Labs (LL) are seen as collaborative platforms
- Inclusive, open and structured innovation space
- Social niches for experimentation aimed at generating solutions to complex sustainability challenges
- Situated in real-life situations
- Relies on network governance attributes such as trust, accountability etc
- Joint implementation of actions

Dimensions of a Living Lab

- Purpose, scope, /mission and values (Why)
- The How of the Living Labs – governance, rules and protocols
- Sustainability of Living Labs– Action/Project oriented
- Capacity building
- Wider engagement, dissemination
- Adaptive planning and implementation