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Knowledge Broker Support Program

Volume 2 – Knowledge Broker Tools

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CSIRO Australia's National Science Agency

30 SPREP PROE
Sustainable, transformative and resilient for a Blue Pacific

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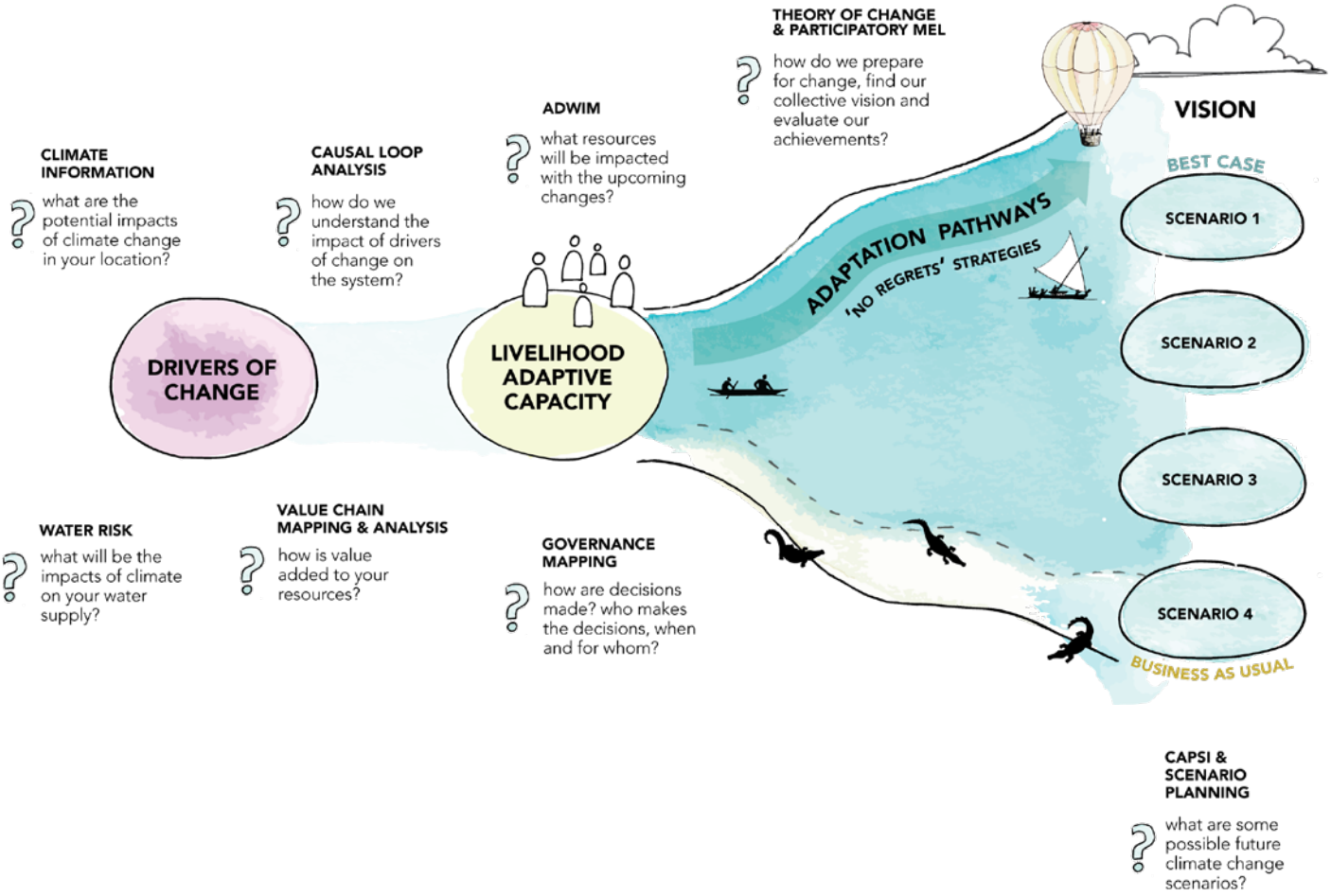
Cover photo: Knowledge broker in action. Photo by Tom Greenwood, 2017. Photo below by Seona Meharg.

Contents



The KBSP enables you to pick and choose the tools and processes you needed to create a community adaptation pathway.
Artwork by Dr Manuela Taboada, Queensland University of Technology

Welcome to the KBSP

The Knowledge Broker Support Program (KBSP) collates tools, processes and case studies to help knowledge brokers mainstream climate change and future uncertainty into their programs. By integrating climate change and future uncertainty, knowledge brokers can increase the likelihood of the long-term success of their programs.

The KBSP toolbox is useful for NGOs, government and private sector individuals who are involved in decision-making at the community level.

Climate change is accelerating. The potential impacts of 1.5°C to 2°C increases in global average temperatures by 2050 on Pacific communities and their livelihoods are likely to be severe. Other drivers of change, such as COVID-19, population growth, and financial and political crises, will continue to emerge and potentially accelerate, interacting with climate change to generate further uncertainty. Decision-making about community development needs to account for these changes and anticipate their impacts while improving human and ecological well-being.

KBSP uses a framework that differentiates the types of decisions that need to occur when taking systems approaches ('clear', 'complicated' and 'complex' decisions) and the types of brokering that are needed for each ('infomediary' or 'knowledge translator', 'knowledge broker' and 'innovation broker'). Different skills are required for knowledge brokers to act as change agents within their system, depending on the context and complexity of decision-making.

Systems thinking is crucial to understanding the context and ensuring that decisions and appropriate interventions are co-designed. A suite of systems tools has been developed around a central 'adaptation pathways' approach, which is a process that supports decision-making when future uncertainty is great. You can follow the course structure in full or choose the modules that will help you with specific issues or stages of planning in your community.

Acknowledgements

The development of the KBSP benefitted from the following:

- Module co-design, development and artwork by Dr Manuela Taboada (Queensland University of Technology). Dr Taboada was assisted by Lydia Boyle (QUT School of Design / Symplicit, Jess Greentree (QUT School of Design), and Jason Bell (QUT School of Design),
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- participants from the first two KBSP cohorts.

How to use the KBSP Manual Volume 2

This manual is a companion to the KBSP online course. For videos, links, presentations and the interactive version of this manual, go to: https://research.csiro.au/pkb/

This volume comprises the **KBSP TOOLBOX**, which will help you answer key adaptation questions and co-develop solutions.

Community Adaptation Pathways

This module focuses on what an adaptation pathway is and the process of developing pathways at community level.

It also demonstrates how various systems tools can support the development of adaptation pathways. This module focuses on community adaptation pathways, but adaptation pathways can be used at all scales, from local to national to international. The module will also show you how adaptation pathways were developed in the Solomon Islands.

This module includes:

1. **What are Adaption Pathways?**
2. **Decisions, politics and power, knowledge**
3. **How to develop Community Adaption Pathways?**
   - **An example from the Solomon Islands – Community Adaptation Pathways for the Solomon Islands (CAPSI)**
4. **Scenario Planning**
5. **Repeating Adaption Pathways Planning**
6. **Including other Knowledge Broker Support Program tools**

What are Adaptation Pathways?

The future is uncertain, and change is happening faster and faster. Climate change is accelerating. But future climates may be very different depending on global emissions, and models have many different results, even for the same emissions models. Other factors may also impact communities, such as global pandemics, terrorism, financial crises and natural disasters. Meanwhile, other change is also happening – advances in information technology and renewable energy, plus population growth and cultural shifts. These factors could combine to form very different futures for the world and communities. This is especially true because globalisation connects the world far more than before, meaning that events in one region can quickly affect communities in another. COVID-19 is a very clear example of this.

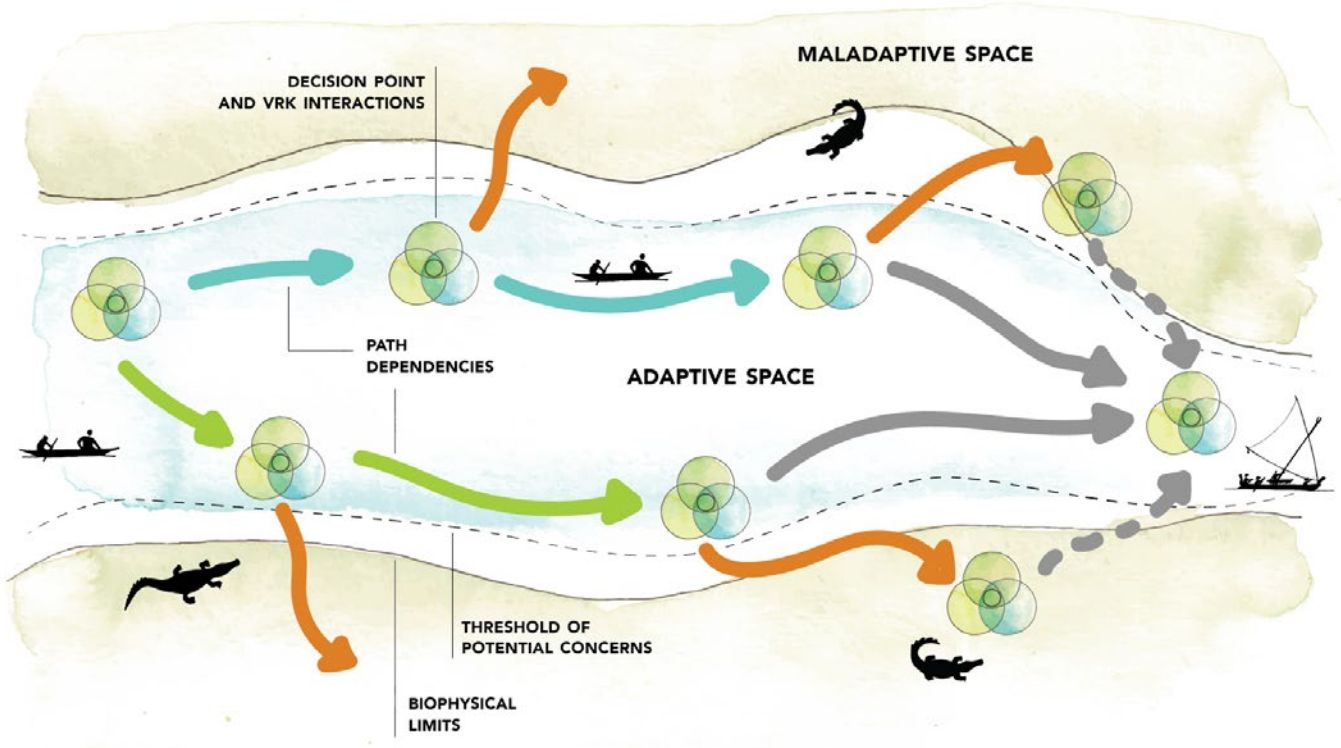

Figure 1 Adaptation pathways. Adapted from: Wise, R.M., Fazey, I., Smith, M.S., Park, S.E., Eakin, H.C., Van Garderen, E.A. and Campbell, B., 2014. Reconceptualising adaptation to climate change as part of pathways of change and response. Global environmental change, 28, pp.325-336. Artwork by Manuela Taboada, Queensland University of Technology

So, how do we plan community development with so much uncertainty?

Some decisions might result in what we need, but others might leave communities more exposed to climate and other impacts or even result in negative or unintended outcomes, termed 'maladaptive'. 'Adaptation pathways' is the practice of decision-making that creates sequences of actions over time to account for rapid change, future uncertainty and shocks (Werners et al. 2021).

The key aim of adaptation pathways is to maintain flexibility to steer away from 'maladaptive' pathways and maintain a pathway towards a community's desired vision for their future. Taking an adaptation pathways approach means regularly scanning the changing future and making adjustments to decisions over time.

Decisions, politics, power and knowledge

Understanding how decisions are made and who makes them central to adaptation pathways. In community development, there are likely to be many different decision-makers involved, with different goals and values, and different kinds of knowledge – creating complex decisions. As a knowledge broker, you will need to know who these 'actors' are and decide how to navigate the politics and power between them, and how best to bring them together and integrate their knowledge. Doing requires acting across the knowledge broker spectrum, from being an infomediary (i.e. facilitating access to information) to being an innovation broker.

As a knowledge broker, you must identify the key decision-makers, how to bring together their knowledge types, and manage the politics and power relations between them.

Figure 2 Different sectors of the community come together to discuss their goals and values.

How to develop Community Adaptation Pathways?

An example from the Solomon Islands (CAPSI)

From 2018 to 2020, a CSIRO project funded by the Australian Government and in partnership with the World Wide Fund for Nature (WWF), Plan International, the Solomon Islands Development Trust (SIDT) and the Australian National University developed a method called Community Adaptation Pathways in the Solomon Islands (CAPSI). In summary, CAPSI involves six steps depicted in this 'roadmap'.

ROADMAP

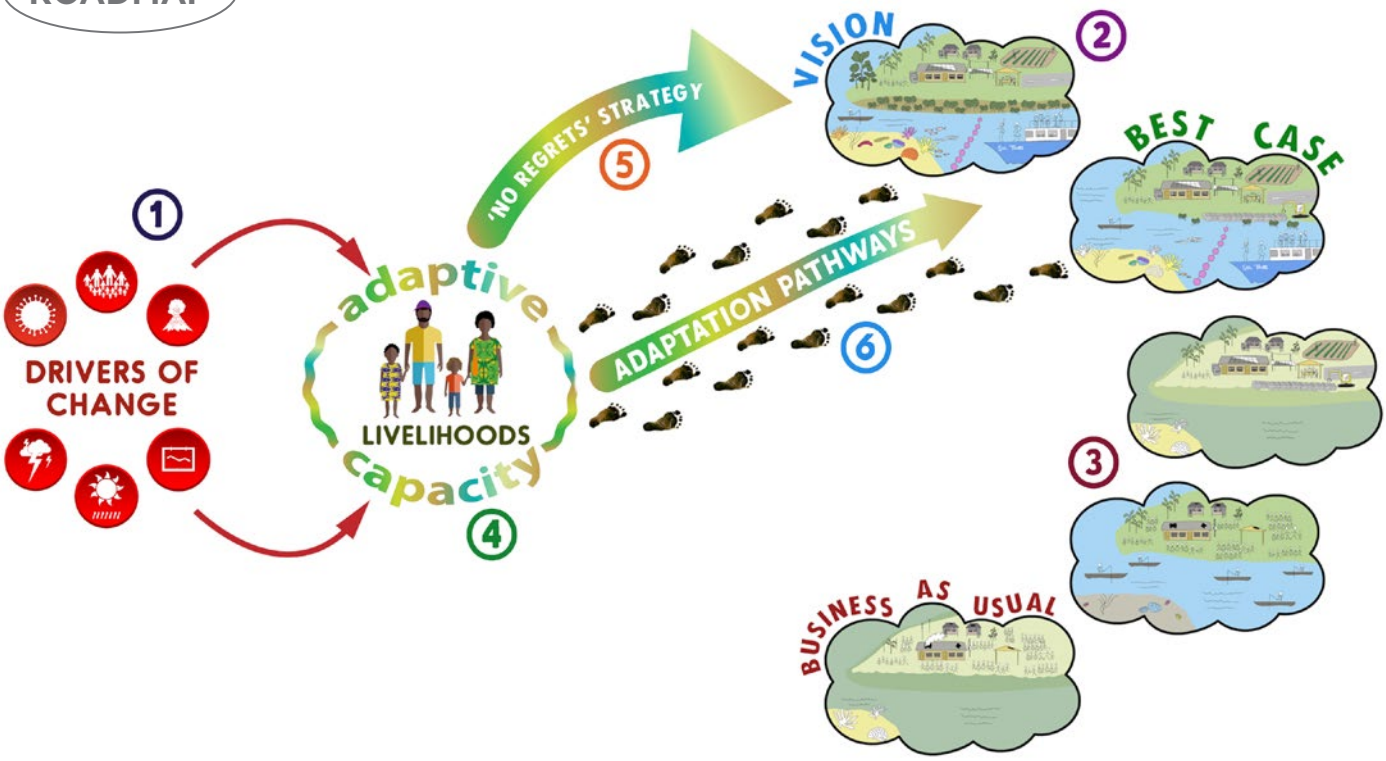

Figure 3 This roadmap outlines the steps of the process that leads to an adaptive plan for your community. The steps are outlined on the following pages. Visual created by Tom Greenwood.

STEP 1 Identify drivers of change affecting the community

Step 1 explores 'drivers of change' which are affecting communities today. 'Drivers of change' are defined as "Any natural or human-induced factor that directly or indirectly causes a change in the system of interest". Examples include climate change, sea level rise, environmental degradation, population growth, economics, pandemics, cultural change, politics, and technology.

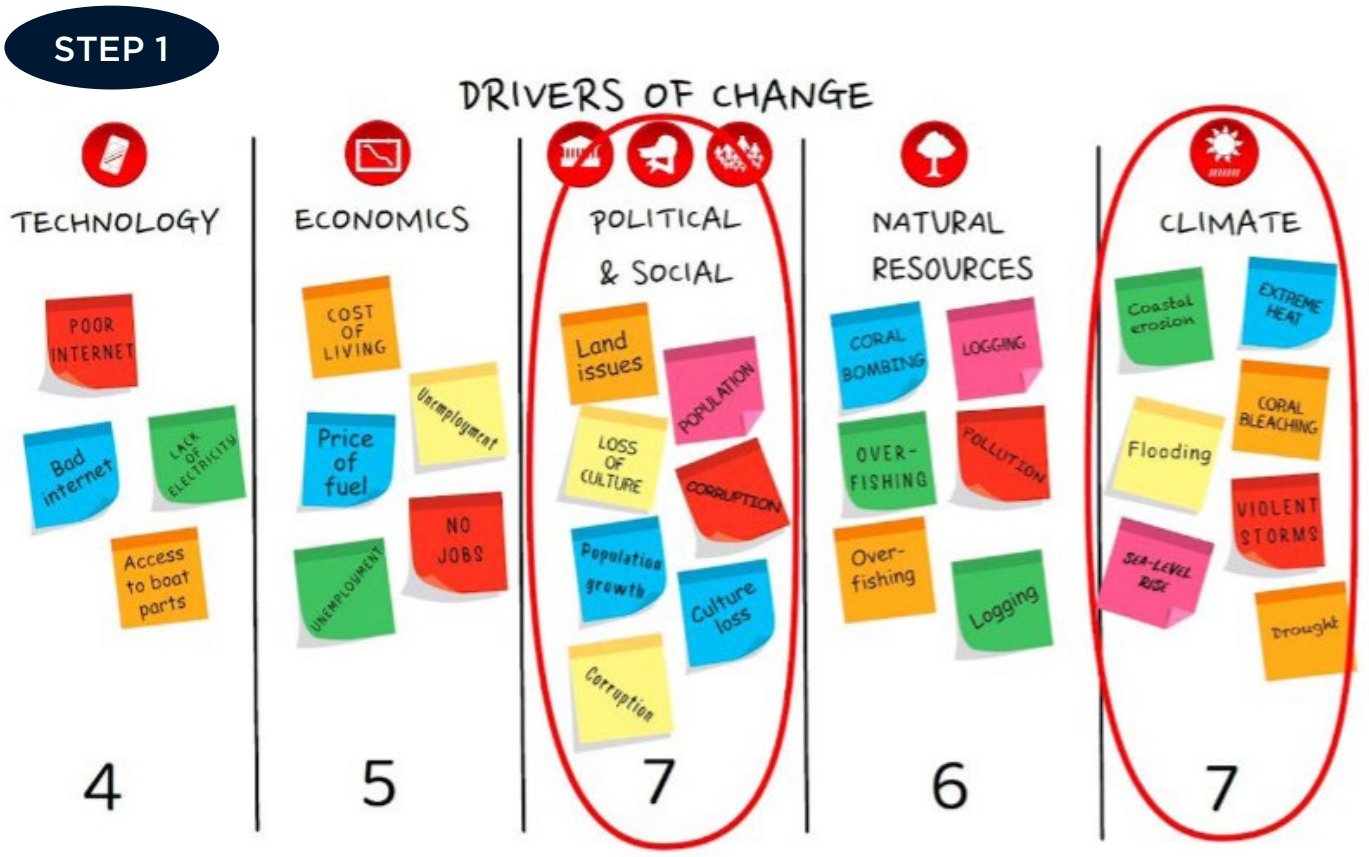

Figure 4 STEP 1 – exploring the drivers of change. Visual created by Tom Greenwood.

STEP 2
Community visions

Step 2 asks participants to discuss and draw the future they want for their children or grandchildren. They should consider all aspects of their lives, including education, food, culture and governance. This vision could be for any year in the future – perhaps 2030, 2050 or 2070. The visions can also consider issues around social inclusion, such as women and girls and people with disabilities.

Figure 5 STEP 2 – developing community visions. Visual created by Tom Greenwood.

STEP 3
Future scenarios / different possible futures

Step 3 explores futures that might happen for the community and their livelihoods based on the drivers of change prioritised in Step 1. Because there is so much uncertainty about the future, and community and government actions may also have an influence, many different futures are possible. Participants create four different scenarios, ranging from 'Best Case' to 'Business as Usual'. The exercise starts by taking the most important drivers identified in Step 1, and drawing them as arrows ranging from 'good' to 'bad' on an axis. You can do this on a white board, paper, or even a flat area of sand.

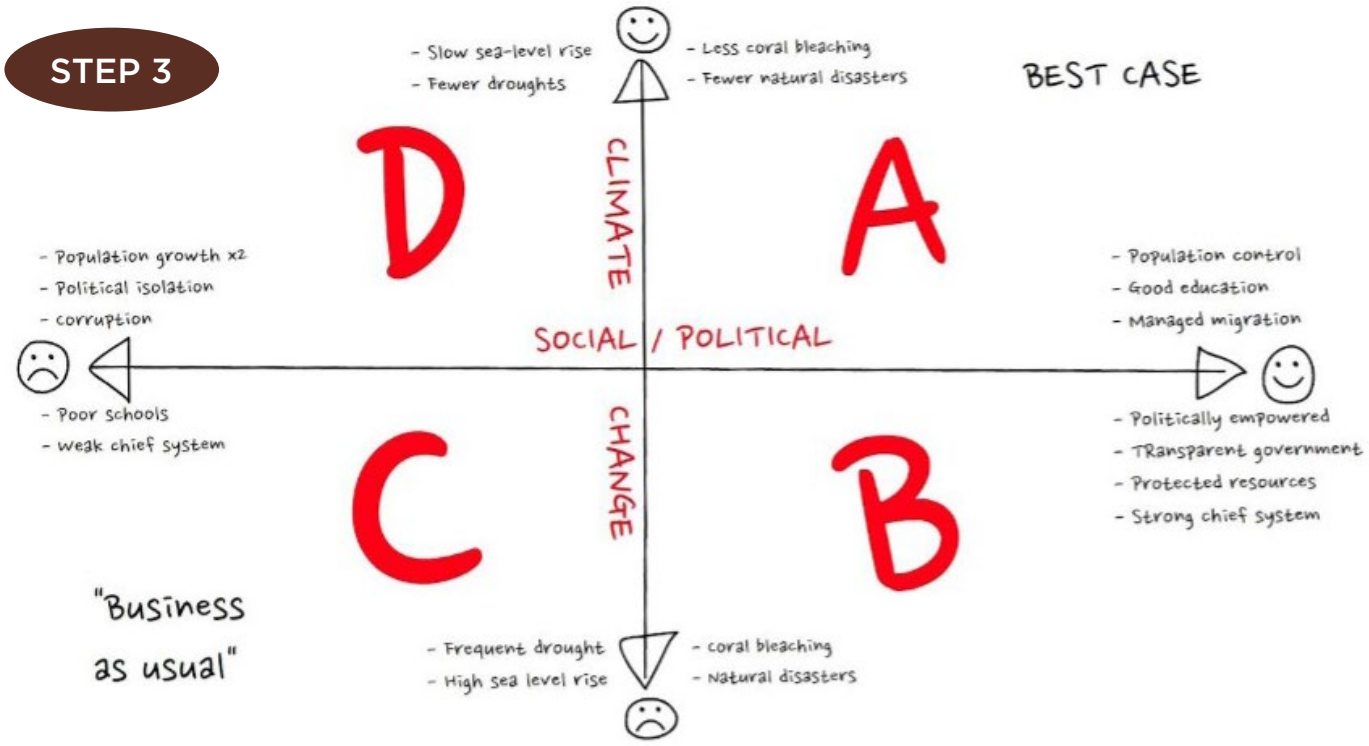

Figure 6 STEP 3 – exploring possible futures. Visual created by Tom Greenwood.

In this example, climate change and social and political issues were the most important drivers. The combinations of these drivers create four potential futures:

A. the 'Best Case', with less extreme climate change and good social and political conditions;

B. an intermediate future with extreme climate change and good social and political conditions;

C. 'Business as Usual', with extreme climate change and poor social and political conditions; and

D. another intermediate future with less extreme climate change but poor social and political conditions.

Participants then draw what they think the community will look like under each scenario and give it a name. This exercise is also covered in more detail in the next lesson.

Scenario under development East New Britain, PNG.
Image credit: Seona Meharg

People discussing their adaptive capacity.
Image credit: Seona Meharg

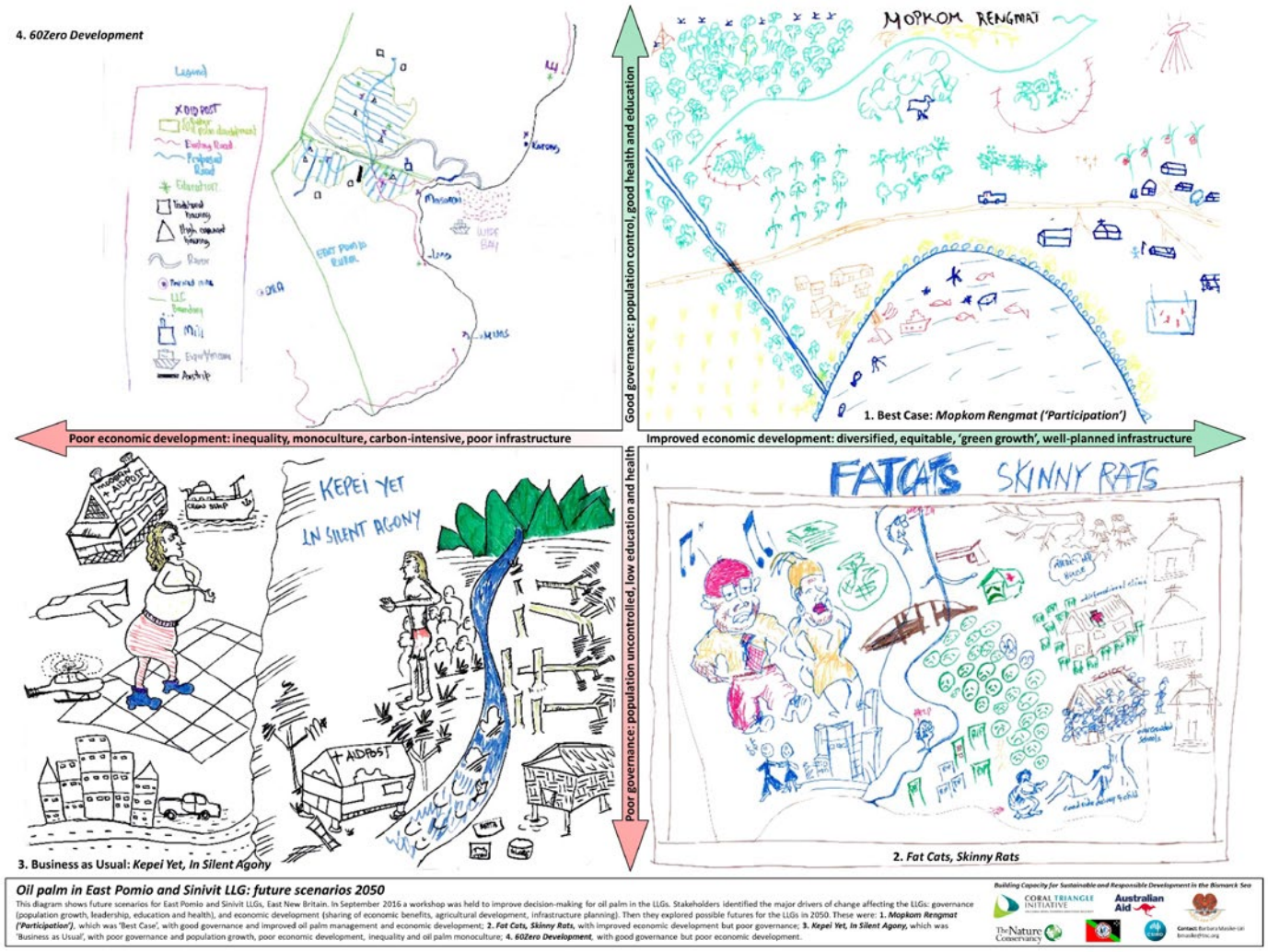

Figure 7 Example of some scenarios on oil palm in East Pomio and Sinivit LLG, Papua New Guinea.
Source: Bismarck Sea project – https://research.csiro.au/bismarcksea/

STEP 4
Community adaptative capacity

STEP 4 asks participants to discuss the 'adaptive capacity' of the community today. Adaptive capacity is "the ability of people and ecosystems to adjust to actual or expected stresses, or to cope with the consequences". We use the 'livelihood capitals' to help people define their strengths and weaknesses: natural, human, social, financial, physical and political. We also consider enabling factors, such as markets, that allow the community to apply their capitals.

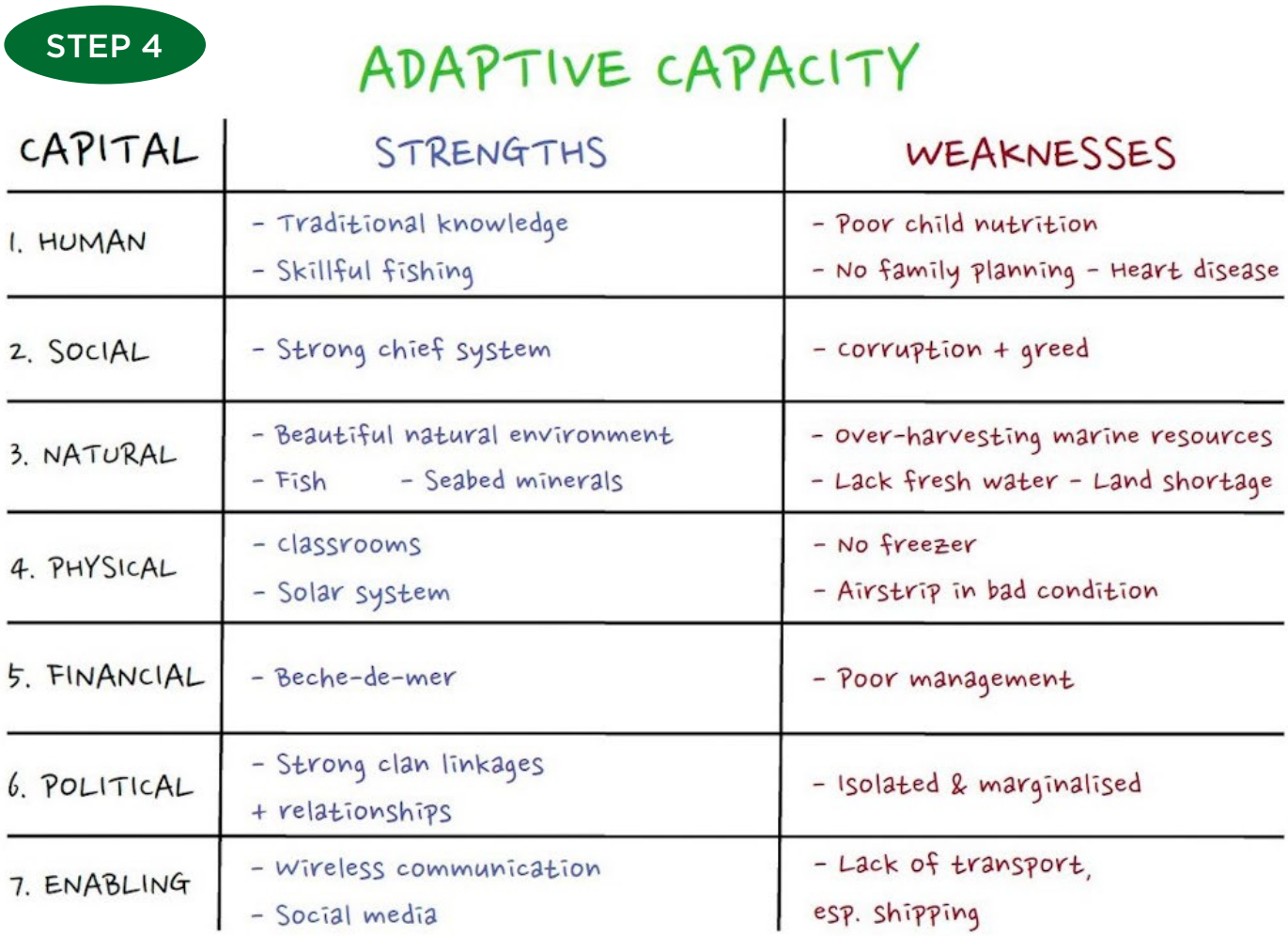

Figure 8 STEP 4 – exploring a community's adaptive capacity by better understanding their livelihood capital strengths and weaknesses.
Visual created by Tom Greenwood

STEP 5
Low or no regret strategies

In **STEP 5**, participants identify the most important strategies needed to progress towards their vision. The results of the adaptive capacity assessment in Step 4 are used to guide them.

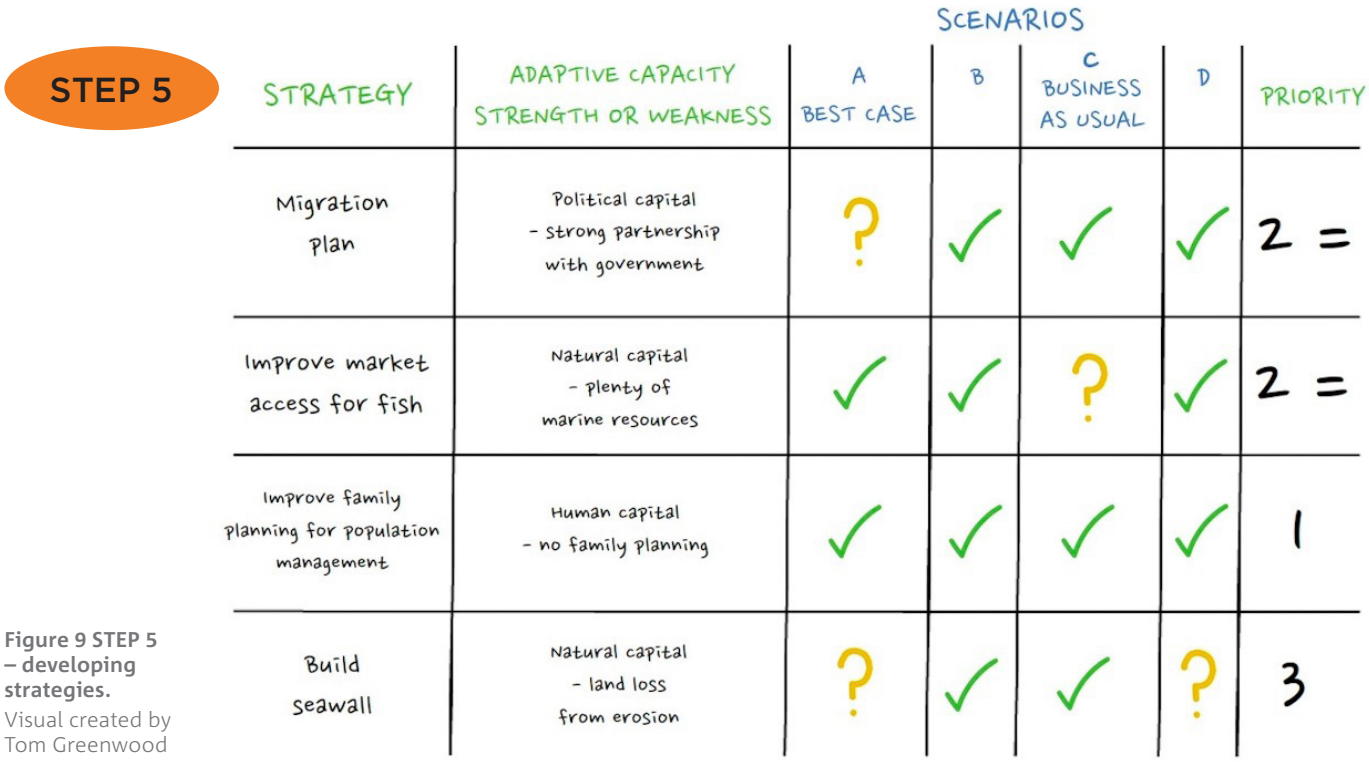

Figure 9 STEP 5 – developing strategies.
Visual created by Tom Greenwood

For example, a migration plan might be necessary to relocate people from an island due to sea level rise. This could build on the community's strong partnerships with the government, which is political capital. Next, participants check each strategy's 'low or no regrets' status.

They use the scenario pictures from Step 3 to compare each strategy and ask:

- What if this scenario happened?
- Would the strategy be a good or a bad thing?"

They place a question mark if the strategy might be maladaptive and a tick if the strategy would be compatible with the scenario. Finally, they prioritise the strategies by totalling the number of ticks – in the example below, improving family planning for population management is the highest-ranked and is the most 'low or no regrets' strategy because it would be compatible with any future scenario

Brokers can ask participants to also think about other changes they are experiencing. The facilitators then divide a board or wall into various themes and invite participants to stick their drivers under the appropriate theme. The drivers are then counted, and the themes with the most drivers are the most important. Through this exercise, it is possible to link local knowledge with an expert or scientific information and understand how different drivers combine to influence the community and its development.

STEP 6
Adaptation Pathways

In the final step, participants draw the 'pathways' of decisions and actions needed to implement the strategies and who should be responsible. In the example strategies from Step 5, a pathways map may look like the picture below. The most important low or no regrets strategy, family planning, should be started immediately, with a series of actions into the future.

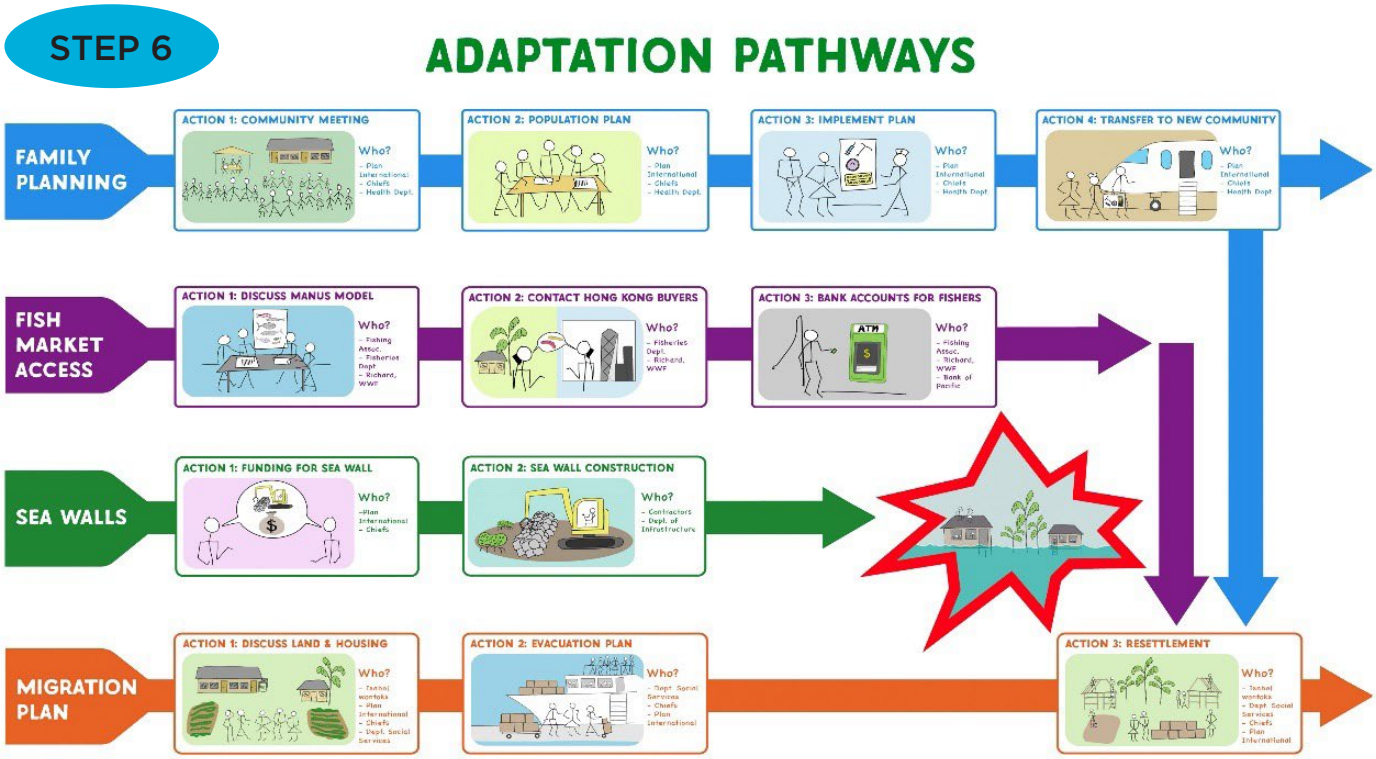

Figure 10 STEP 6 – develop adaptation pathways. Visual created by Tom Greenwood

For example, these might include the Health Department meeting with chiefs to request resources, community meetings to agree on the need for population control, and developing and implementing a population management plan.

Other actions should also begin immediately, such as improving access to fish markets. Building sea walls would start with funding before moving to construction. A migration plan might mean discussing land and housing with the government and other partners on the mainland before developing a community evacuation plan. However, if sea level rise inundates the island, the sea walls and fish market pathways will no longer be relevant because people will have to move off the island, which will be the next action of the migration plan. When inundation happens, the family planning and fish market pathways will have to be linked with the migration plan and the community's new settlement.

Scenario Planning

Scenario Planning is about exploring future scenarios that represent potential uncertainties in the drivers of change. It can also be useful as a stand-alone tool.

Future scenarios are defined as 'articulations of multiple alternative futures that span a key set of uncertainties, applying quantitative or qualitative methods and data to describe plausible trajectories of a system'. (Carpenter et al. 2015)

They are very useful for integrating different types of information and knowledge to explore the future. They can be applied to almost anything – a household, a city, a river catchment, a community, a country, or even the world.

You can learn more about the many **types of scenarios** at https://www.aidr.org.au/media/6932/04-scenarios.pdf

For more on **scenario planning** you can:

- Watch a YouTube video on this module, please see https://www.youtube.com/watch?v=zIAFSUCgAnk
- Explore the scenario planning tool on Learn with ACIFID at https://learnwithacfid.com/pluginfile.php/7580/mod_resource/content/2/Scenario-Planning-Tool.pdf

Repeating Adaptation Pathways Planning

Finally, it is worth remembering that the community adaptation pathways process should be repeated over time, and the pathways reviewed and revised to adjust as change happens. If the strategies are low or no regrets, they should be appropriate under any circumstances, but constant learning and reflection are always important when dealing with complex decisions. This diagram shows how adaptation pathway cycles help maintain the pathway towards the vision and avoid maladaptive pathways.

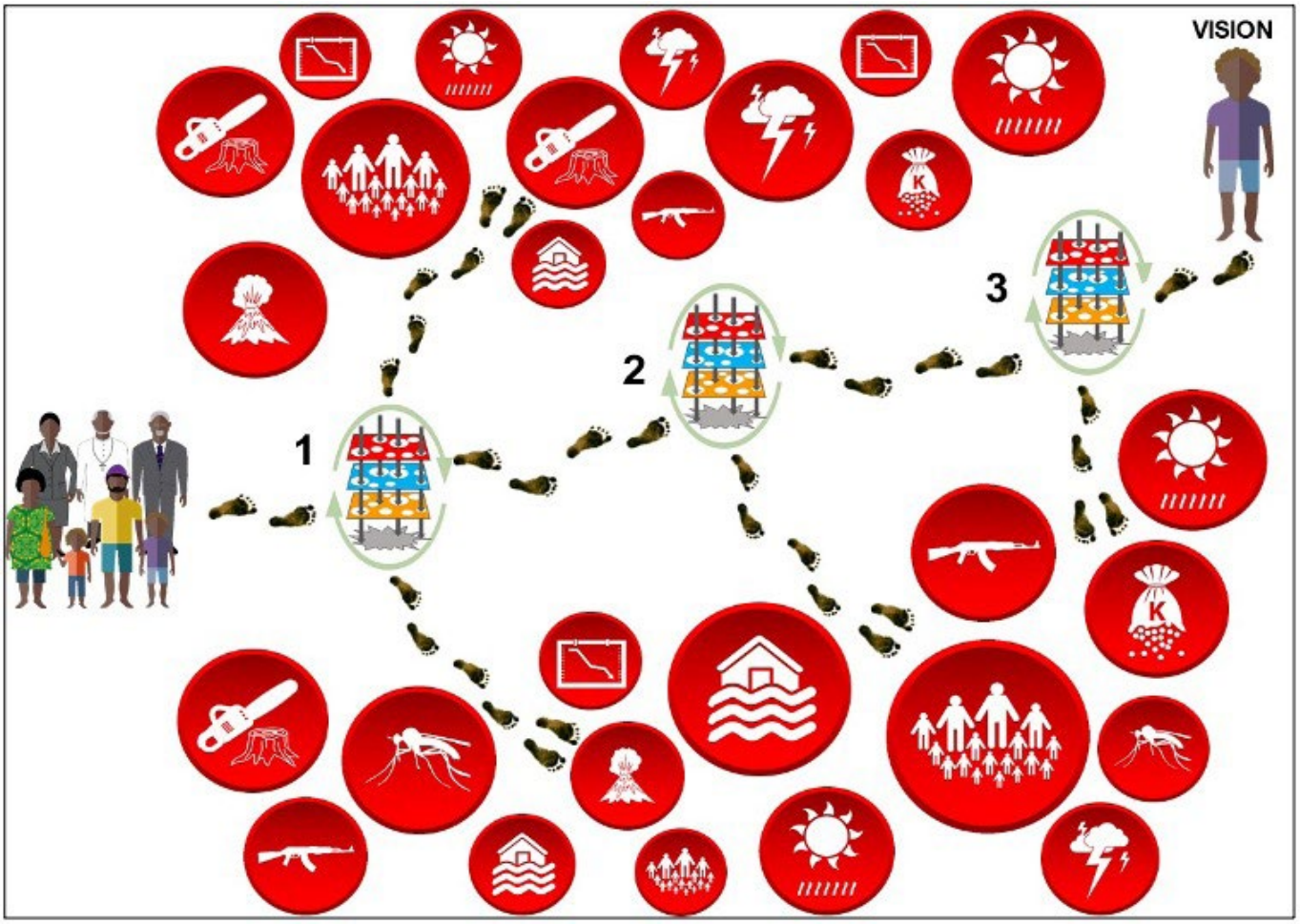

Figure 11 Repeating adaptation pathways. Visual created by Tom Greenwood

Including other Knowledge Broker Support Program tools

The other tools offered in the KBSP program can contribute to different aspects of the community adaptation pathways process by answering particular questions in more depth.

Adding these tools to a CAPSI process is not strictly necessary and depends on the amount of time and resources available and the scope of a community development project.

These tools can also be useful as stand-alone activities, depending on the aims of your project and the resources available.

For example:

- **Governance Mapping** can analyse current decision-making, and identify who should be involved in the adaptation pathways process. It can also inform aspects of Step 4, the livelihood adaptive capacity assessment.
- **Downscaled climate projections** and their impacts on water security and value chains can be used to examine drivers of change in Step 1. More generally, projections of potential climate change can inform possible future scenarios in Step 3.
- **The Well-being Impact Model** (also called ADWIM) can combine climate projections and population projections to analyse their potential impacts on natural resources and livelihoods in Step 1 or Step 3.
- **Theory of Change and Participatory Monitoring Evaluation and Learning** (MEL) can map out the actions needed to implement adaptation pathways, assess whether they are being achieved, and if not, how to make adjustments.
- **Causal Loop Analysis** can be used to understand the drivers within the system and the potential impacts in order to develop interventions.
- **Value Chain Mapping & Analysis** can be used to understand the impact of climate change and other external drivers of change on value chains important for livelihoods of vulnerable communities.
- **Water Risk** and tools, such as for estimating water balance, can be used to gain a better understanding water systems to improve decision making.

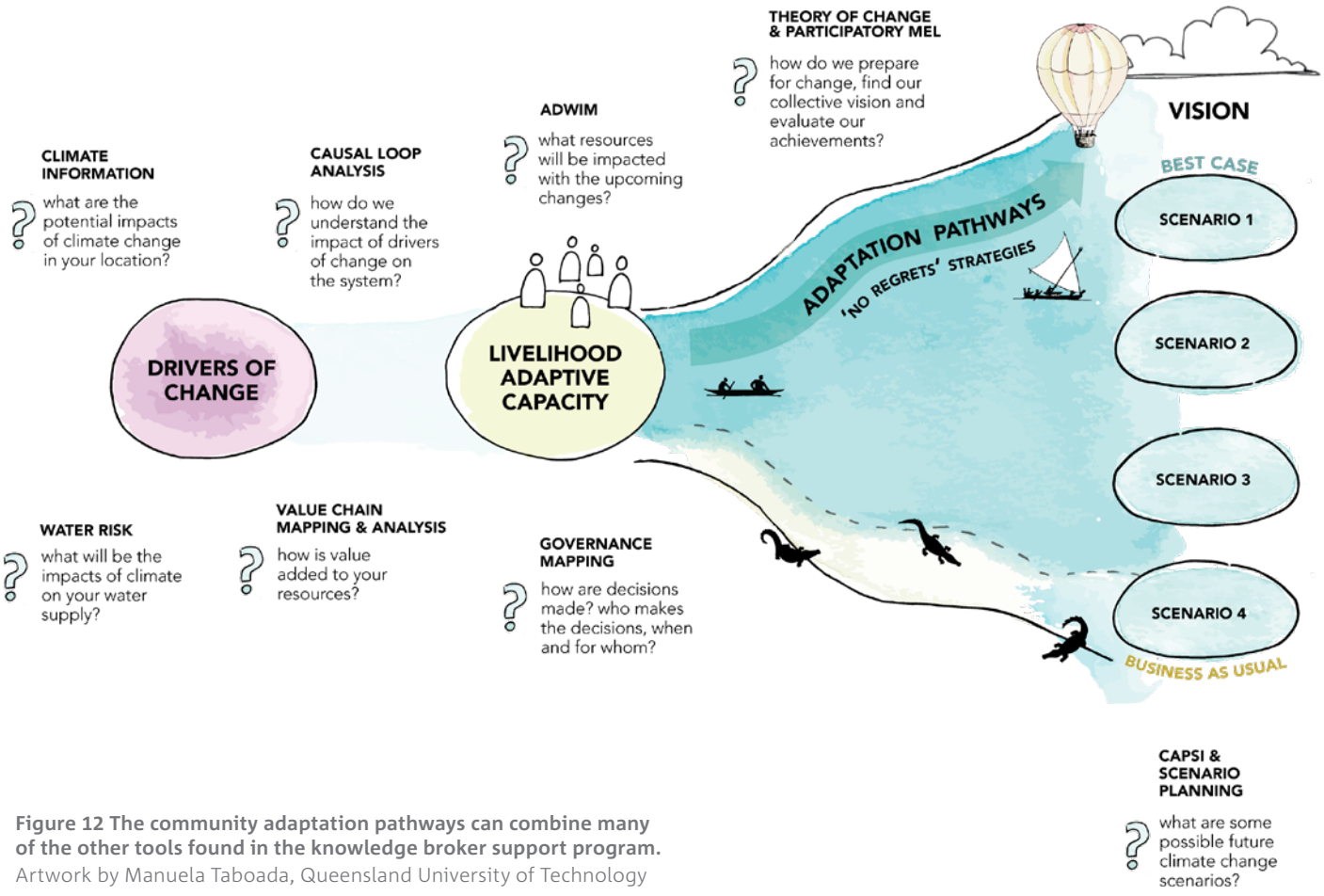

Figure 12 The community adaptation pathways can combine many of the other tools found in the knowledge broker support program.
Artwork by Manuela Taboada, Queensland University of Technology

References and additional resources

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/watch?v=zIAFSUCgAnk

Resources

You can watch this 20 minute video to **learn more about CAPSI** https://vimeo.com/579566387

If you would like to **learn more about the many types of scenarios,** see: Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making. 3 Guidance on Scenarios

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This module was developed by:

James Butler (CSIRO): a sustainability scientist with a background in agricultural economics, terrestrial, freshwater and marine ecology gained in southern Africa, Europe and Australia.

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- **Shannon Seeto (WWF)**
- **Richard Makini (WWF)**
- **Zelda Hilly (WWF)**
- **Slade Pita (Solomon Islands Development Trust)**

Water risk

This module is structured around three key messages for knowledge brokers:

- **A systems approach to managing water helps us understand both the natural system and how people interact with it. Working collaboratively to build trust and shared understanding supports collective actions for managing water systems.**
- **Quantitative information, such as data and models, is both powerful and has limitations when managing water systems.**
- **Understanding existing and future water risks helps inform better actions now.**

This module includes:

1 **Introduction to water risk**
   - **Why water?**
   - **Water systems**

2 **Water balance**
   - **What is a water balance?**
   - **How to undertake a water balance**

3 **Water risk**
   - **Climate change and water systems**
   - **Developing a water risk action plan**

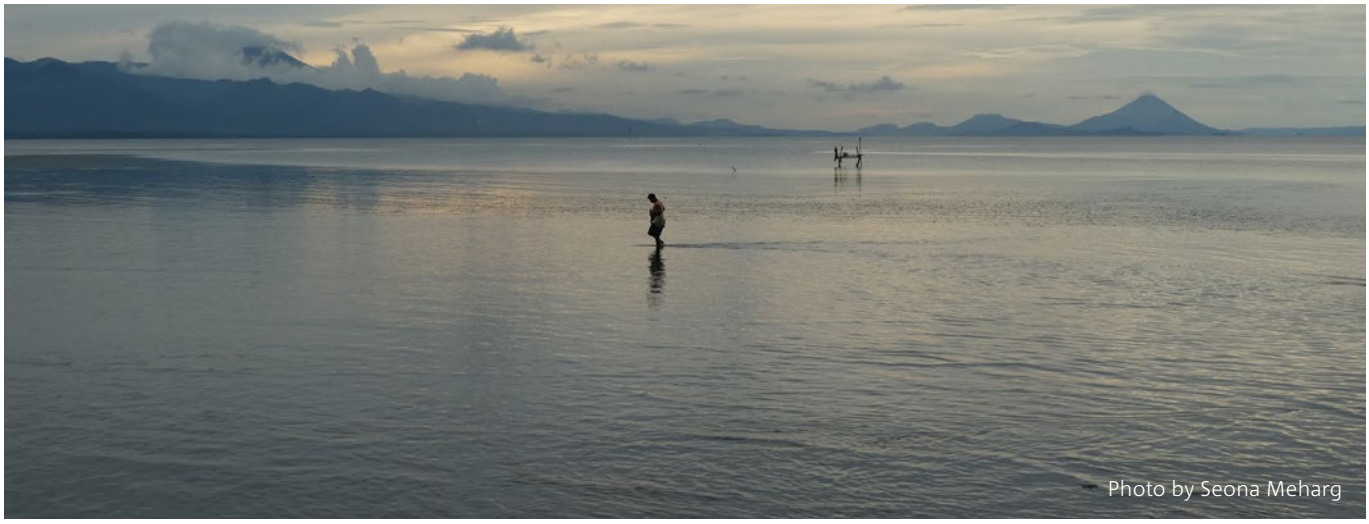

Photo by Seona Meharg

Why water?

Understanding water systems is essential to our very existence. Managing water requires a balance between living with natural forces and taking action to reduce our risk to hazards such as cyclones, storm surge, landslides, or a lack of adequate, accessible, and safe water.

It also typically involves trade-offs with conflicting objectives. Knowledge brokers are needed to support the understanding of water systems and help stakeholders negotiate for a better outcome.

Ensuring the resilience of water systems is needed now to better withstand the impact of future risks such as climate change. The pressure for development continues with issues such as logging, population growth, and infrastructure development, all of which impact our water systems.

Like climate adaptation, water issues are examples of 'wicked problems' because there are so many uncertainties and no single solution. By understanding and communicating uncertainty well, you can find ways to make wise decisions despite large uncertainties.

Water systems

Water systems are about both the natural environment and people.

We often only think of water in terms of how we directly interact with it – such as getting it from a tap, needing it for agriculture, or being impacted by a flood. However, to understand how water reaches or affects us, we need to understand where it comes from and how it reaches us.

Given that water systems are being managed for people, it's important to understand how people interact with water. The problem may not be physical, such as too much or too little rain, but a social, political, or economic one that dictates how water is managed. We need to understand what drivers impact water availability, such as logging, population pressure, climate change and infrastructure.

https://www.waterforwomenfund.org/en/news/resources/PLANPNG_WFW341_SurfaceWater-A1-poster.pdf

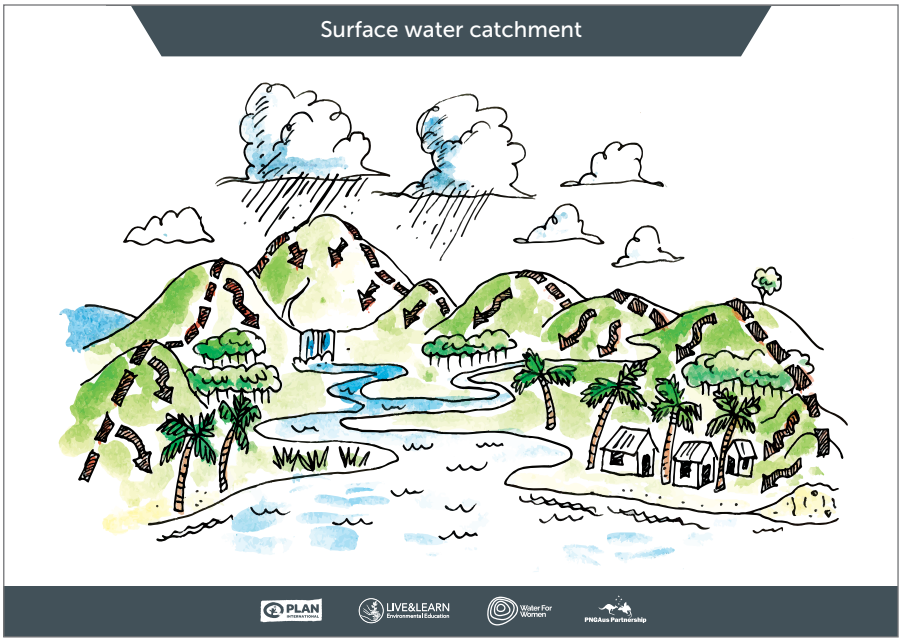

Figure 13 Surface water catchment. Source: Water for Women

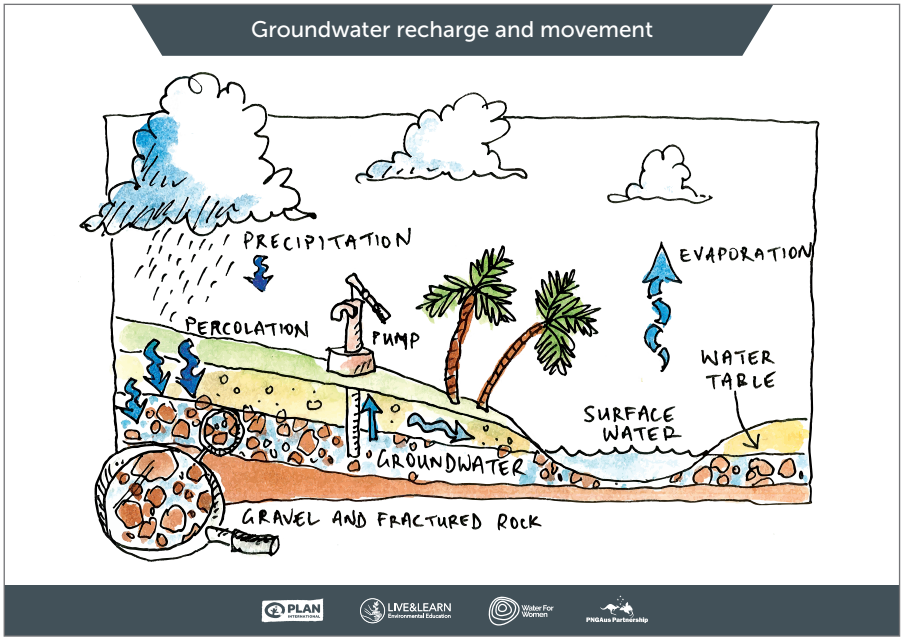

Figure 14 Ground water recharge and movement. Source: Water for Women

Figure 15 Aspects to consider in Water Management (CSIRO)
Photo by Brendon Teava, Live and Learn, Solomon Islands

Water systems in the Solomon Islands

In the Solomon Islands, water is often collected in protected or unprotected storages.

An example of a protected storage is a "spring box" – an enclosed storage tank that collects shallow groundwater. Water then flows through a pipeline to tap-stands.

Not everyone has equal access to the tap stand. Some women live further away, making access harder. Pressure can be lower at the end of the system due to design and leakage. A growing population can also put pressure on the system.

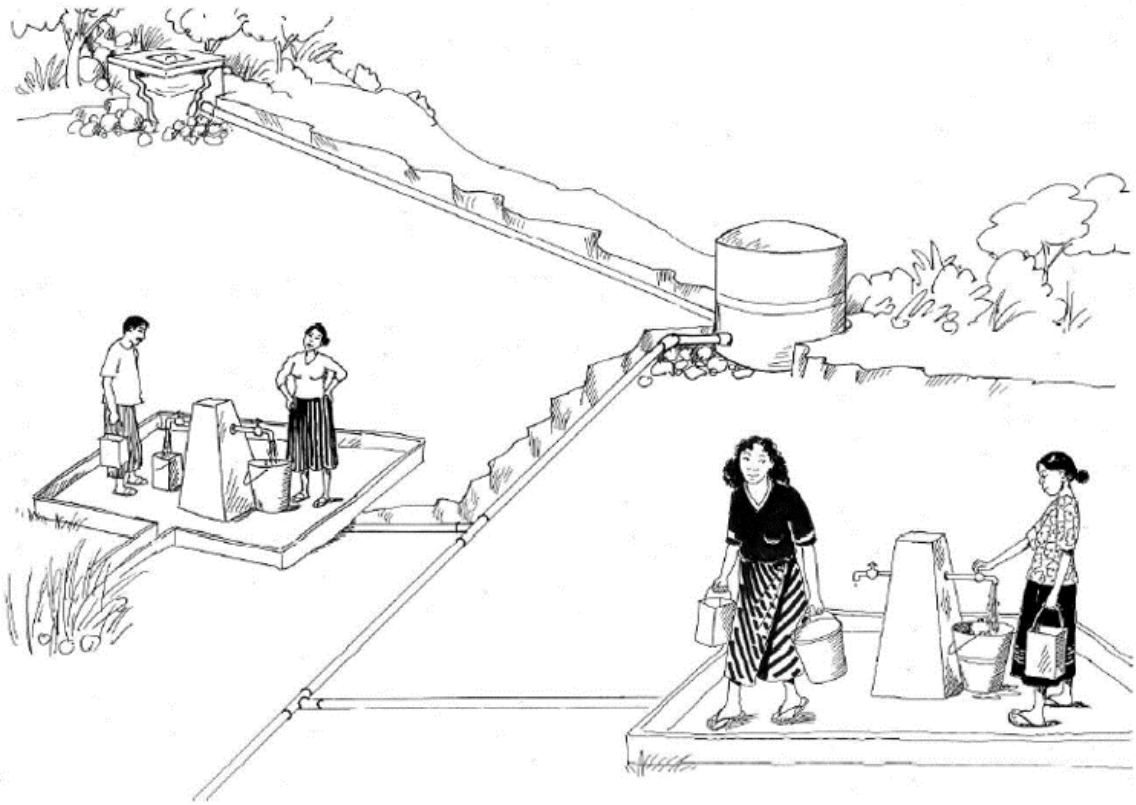

Figure 16 Protected water storage – spring box. Adapted from: The Solomon Islands Rural WASH Community Engagement Guidelines. Caretaker's Manual. Rural WASH Programme, Environmental Health Division, Ministry of Health & Medical Services. August 2020.

QUESTION – In a water system you are familiar with, is the main challenge one of natural resources (e.g. too much or too little rainfall) or a human one?

What is a water balance?

A water balance calculates the amount of water available in different parts of the water system, and compares this with the amount of water used by people and the environment.

Not all precipitation (rainfall) reaches the village. Rainfall may become surface runoff, groundwater, or leave the system as evapotranspiration.

A water balance can be quantitative, where we estimate the amount of water, or it can be qualitative – where we focus on how water moves through the system. This section explores a water balance tool that can help you understand different parts of the physical components of the water system.

As knowledge brokers, this tool will help you to:

1. **Understand how the water system works and is connected.**
2. **Identify the main issues and sources of uncertainty.**

A water balance helps to manage water now and plan for the future.

Understanding different amounts of water in the system can help you work with communities so they can understand what the key challenges are.

The challenge for knowledge brokers is how to take this type of information and translate it in a way that supports decision making in communities.

In this example, only a proportion of the total rainfall over the catchment ends up as surface runoff, flowing down the slopes and through the forest. It may end up in creeks, rivers, and the sea. Some rainfall will also infiltrate the soil and may end up in shallow or deep underground storages (aquifers).

While we will not use quantitative estimates in this course, we can use similar demonstrations using buckets or rainwater tanks to illustrate to community members how the amount of water changes through the system.

Working with communities. Photo: Enif Petsakibo, Live and Learn Solomon Islands

Estimating water balance requires the following steps

STEP 1: Understand the catchment

STEP 2: Estimate water availability

STEP 3: Estimate water use

STEP 4: Risk and future change

Once you have undertaken a water balance assessment to better understand the existing system and potential future risks, you can also use a Water Risk Action Plan such as that used in the Community-based Water Security Improvement Planning Project (*Gud wata plan blong iumi*) to help identify how to remove, mitigate, or reduce vulnerability to these risks.

This module also covers how to undertake a Water Risk Action Plan.

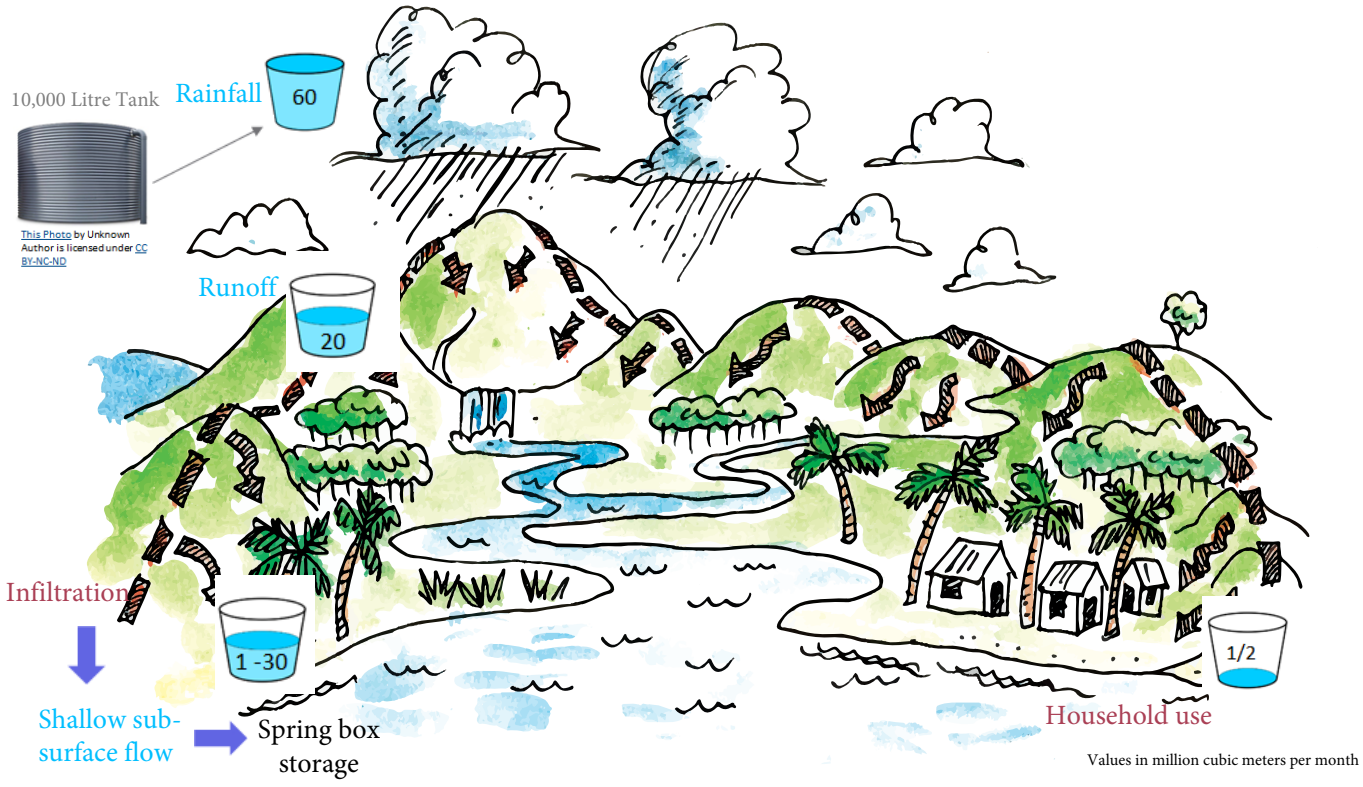

Figure 17 Estimating the amount of water. Source: Water for Women, Live and Learn Environmental Education and Plan International. Artwork adapted by Manuela Taboada, Queensland University of Technology

STEP 1 – Understanding the catchment

Anything that happens in the catchment can affect the water quantity and quality, such as land clearing for logging.

It is helpful to know the catchment area (so we know the total amount of water) to understand what happens to rainfall once it falls on the catchment; this includes the slope and land cover as:

- There is generally higher surface runoff when the slope is steeper and with less vegetation.
- A less steep slope with more vegetation and forest typically means more infiltration.

More surface runoff with less vegetation can result in erosion or washing away of the topsoil and chemicals from the land, which can pollute water sources, such as unprotected rivers and wells, and increase the risk of flooding.

Figure 18 Understanding the catchment area. Credit: Anthony Nadelko, CSIRO

STEP 2 – Estimating surface water availability

To understand surface water availability, you need to know two key pieces of information:

- rainfall
- loss across the catchment.

When looking at rainfall, we want to think about how much there is and how variable it is. We can ask questions such as:

- How often does it rain?
- How often does it flood?
- How often is it really dry with no rain or not enough rain?
- How does it change during the year?
- How does it change between years?

Loss across catchment

Once you have the amount of water falling over the catchment, you can estimate how much of this is either 'lost' from the catchment, infiltrates into the ground, or ends up as surface runoff.

Rain falls from the sky where it may fall onto trees, grass, bare soil, or paved surfaces. Only a proportion of this rain reaches the ground to flow over the surface or soak into the ground and become groundwater. Trees may intercept this rain and stop it from reaching the ground. Plants may also use this water to grow, or it may evaporate back to the sky.

This can be discussed in the context of the catchment – as you saw earlier, more water becomes surface runoff if the catchment has a steep slope, and has bare, clay soil, compared with a catchment that has a gentle slope, lots of vegetation, and/or more sandy soil.

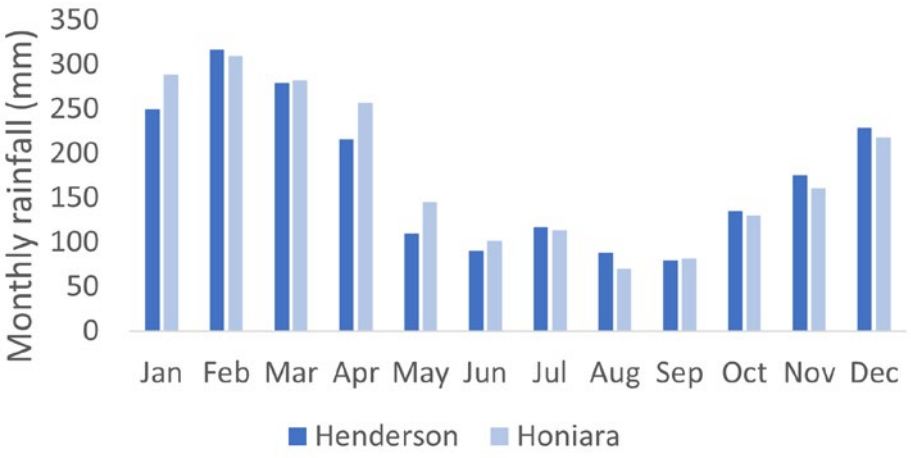

Figure 19 Examples of observed monthly rainfall data showing less rain in the middle of the year

STEP 3 – Estimating water use

This module does not look at methods to estimate water use but it is based on number of people within the catchment using the water, how much they use at a household level and what activities exist in the catchment that use water (e.g. crop irrigation, industrial activities etc). You may need a specialist to assist you.

STEP 4 – Risk and Future Change

Determining water risk

After examining how water moves through a catchment to understand water availability, we can then look at water risk. Exploring risk helps understand what potential hazards exist, the likelihood of them occurring, and the potential impact if they did occur. These hazards could be due to natural events like floods or human, such as a leaking pipe.

Risk assessments help identify and manage these risks. They can be existing risks, such as an unprotected drinking water source, or future risks, such as a changing climate or land clearing.

Actual risks can be different from perceived risks. This matters because the impacts of a hazard like a cyclone are greatly influenced by the nature of the hazard and the social, political, and economic decisions that shape our exposure and vulnerability to it.

In the context of climate change, the Intergovernmental Panel on Climate Change (IPCC) defines "risk" as "the potential for adverse consequences where something of value is at stake & where the occurrence and degree of an outcome is uncertain." Adverse consequences can arise directly from climate hazards themselves and from responses to that hazard.

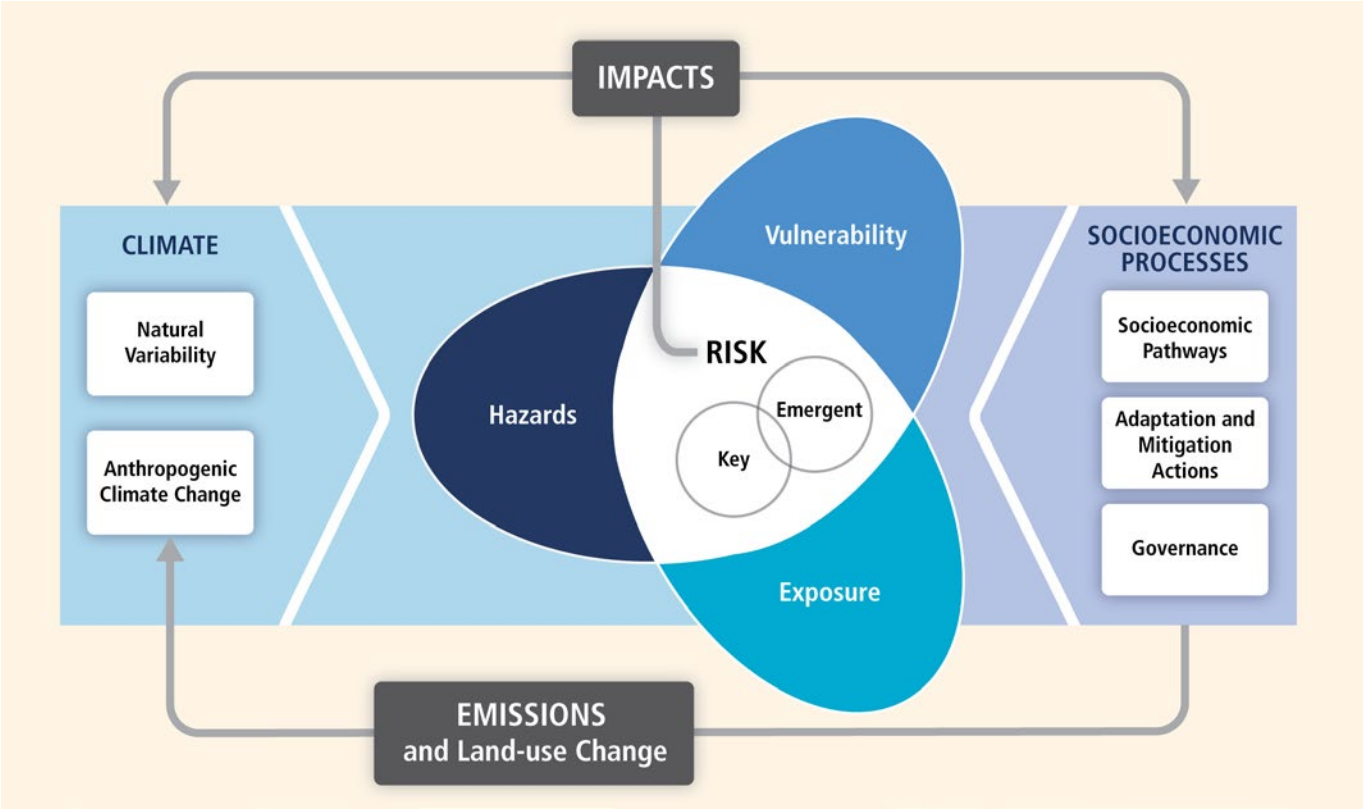

Figure 20 Risk the potential for adverse consequences where something of value is at stake and the occurrence and degree of an outcome is uncertain. Figure 19-1 from **Oppenheimer, M., M. Campos, R. Warren, J. Birkmann, G. Luber, B.C. O'Neill, and K. Takahashi, 2014: Emergent risks and key vulnerabilities. In:** ***Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*** **[Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1039-1099.**

Sea wall Image credit: Seona Meharg

SEA WALL EXAMPLE

For example, a policy to build sea walls in anticipation of sea level rise could have adverse consequences and cascading impacts because sea walls are expensive and have other impacts on the local environment. Adverse consequences can be on lives, livelihoods, health and well-being, ecosystems, economic, social and cultural assets, services (including ecosystem services), and infrastructure.

For example, sea walls may cause waterlogging behind the wall as they trap rainfall leading to health hazard of standing water including malaria and water borne diseases. They can also cause erosion in surrounding areas or be inadequately maintained, leading to structural failure.

To navigate these risks, it is important to explore not only the existing risks but to identify potential risks that may occur in the future as a result of the intervention.

We don't know exactly what the future will look like, but we can ask

- What changes might happen?
- Where, when, and how might we be exposed to hazards (such as flooding)?
- What makes us more vulnerable if we are exposed? (E.g. children, elderly people, people with a disability cannot evacuate as quickly.
- What changes would we like to have happen?
- What can we do now to implement desirable changes and manage changes that we don't want?
- Who would need to implement these? What do we have control over, and what don't we control?

Many factors are driving and influencing change in water systems, and the interactions between them will ultimately determine the accessibility, affordability, reliability and quality of water for people.

The image below shows how some of these interactions may play out in the system.

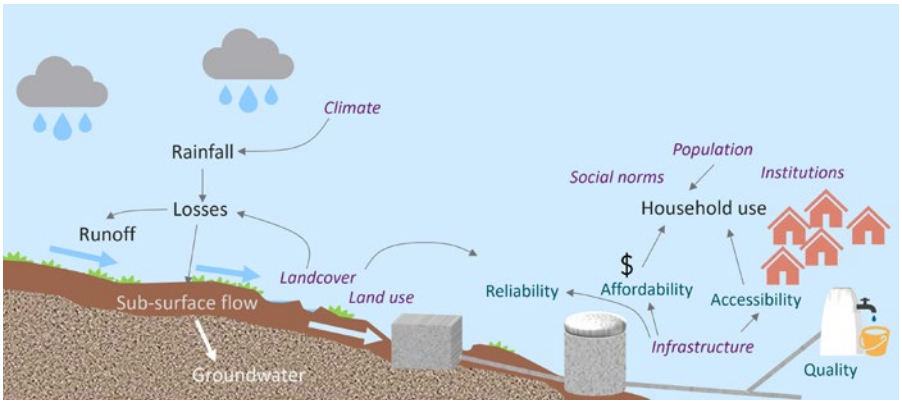

Figure 21 Risks and drivers

Climate change and water systems

Discussing the water balance with a community can help build shared awareness of future water availability and use issues.

To explore future water availability, we can draw on available information on future climate projections (see the module on Climate Information).

Using this information, discussions can be held with the community to explore different possible futures, and what "low regrets" actions they could take now that would be helpful in any future. You can use the Community Adaptation Pathways tool to help facilitate this by asking questions identifying community adaptive capacity strengths and weaknesses. You can then build on the strengths to create low-regrets strategies that benefit the community in any future.

These questions could include:

- How might livelihoods be impacted by future changes in your catchment, water supply, and waste systems?
- When have there been floods, droughts or other extreme climate events in the past? What impacts have these had on your water systems? What has helped people cope and recover from these impacts?
- If it is wetter in the future and flooding increased, what are the likely impacts to existing and planned infrastructure? Should any new infrastructure be built in places with lower flood risk?
- If more land was cleared, what would the impact be for runoff when it does rain heavily?
- What adaptive capacity strengths can support future planning?

Figure 22 Guadalcanal 2050 projections

Developing future scenarios

If there is the opportunity to work with specialists, a quantitative water balance model can also help to explore how the system may change in the future due to changes such as climate, as well as due to many other types of changes such as land use or logging.

Once you know more about how different parts of the water system are impacted, you can start exploring which risks are due to the natural water system – such as too much or too little rain – and which risks relate to how the water system is managed. For example, what could it mean for decisions being made in the Water and Sanitation Health (WASH) sector?

The **Water Risk Action Plan** tool developed by the International Water Centre, Plan International, and Live and Learn can also assist in identifying risks and strategies for managing these.

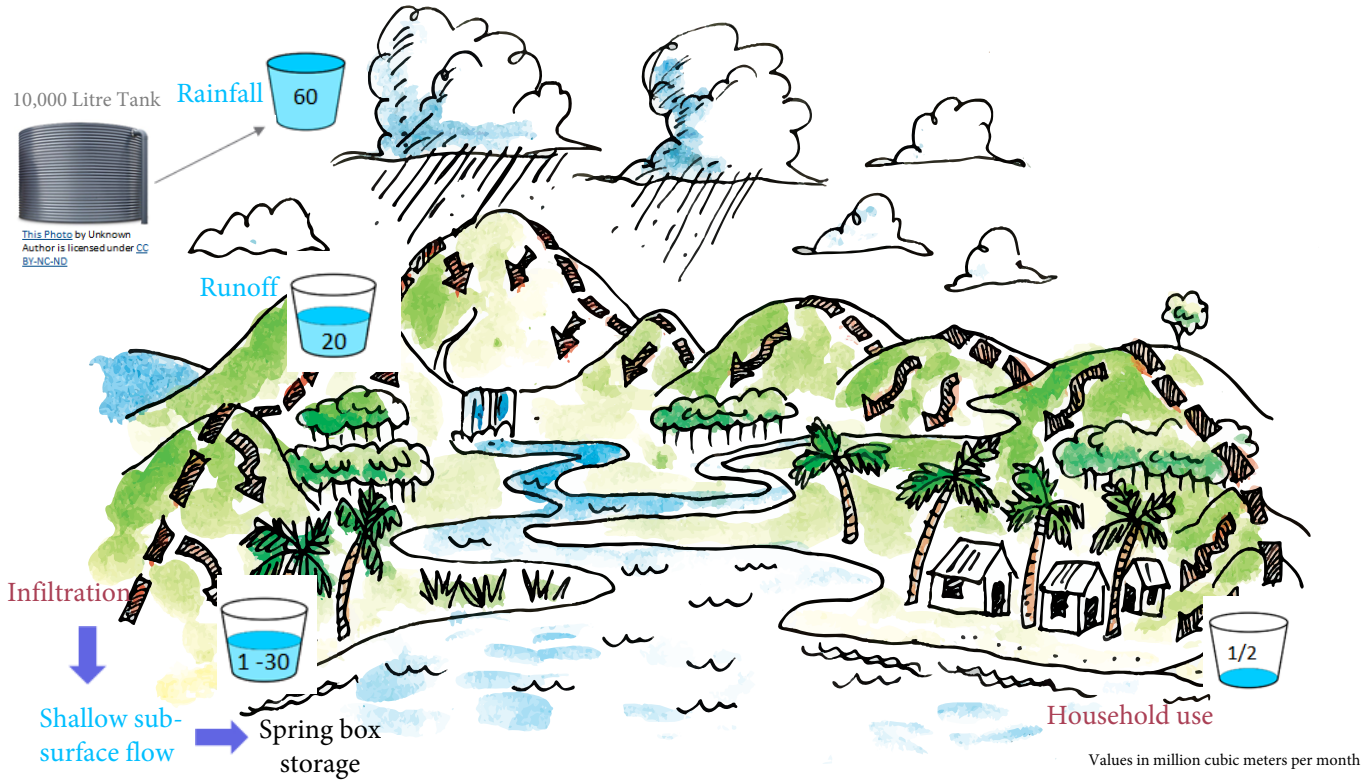

Figure 23 Water balance model. Source: Live and Learn Environmental Education and Plan International.
Artwork adapted by Manuela Taboada, Queensland University of Technology

TOOL: Developing a water risk action plan

An Action Plan can be used with communities to identify what actions need to be undertaken, by whom, and when to address identified existing and future hazards.

Live & Learn Environmental Education and Plan International have been trailing and implementing an Action Plan developed in collaboration with the International Water Centre (Griffith University) through the Water for Women Community-based Water Security Improvement Planning project in the Solomon Islands. The process has been implemented for existing hazards and will soon be trialled for future hazards.

Key steps in the water risk and management approach by the Water for Women Project are:

STEP 1 – Identify risks and hazards to community water systems.

STEP 2 – Identify control and mitigation measures for risks and hazards.

STEP 3 – Develop an Action Plan.

STEP 1 – Identify risks and hazards to community water systems

Assessing the risks to a water system can enable village resources to be prioritised to address hazards that have the biggest impacts.

In Solomon Islands villages, representatives from each zone within the community facilitated conversations within their own household settings. Conversations identified the main drinking water sources and access points, and any water-related issues experienced by people.

In assessing the risk in water systems, the team assessed the severity, likelihood, exposure and vulnerability to a range of risks.

Working with zones – male, female, youth and older representatives from zones encourage all water experiences to be recognised and addressed. (Cret: Regina Souter, IWC)

Explanation of severity, likelihood and exposure level

1. **Severity** is how serious (bad) the effects of this hazard are (e.g. could they cause death or are they less severe). Levels of severity are categorised as high, medium or low.
2. **Likelihood** and exposure of how likely a hazard is to happen and how many people be affected. Levels of likelihood are categorised as high, medium or low.

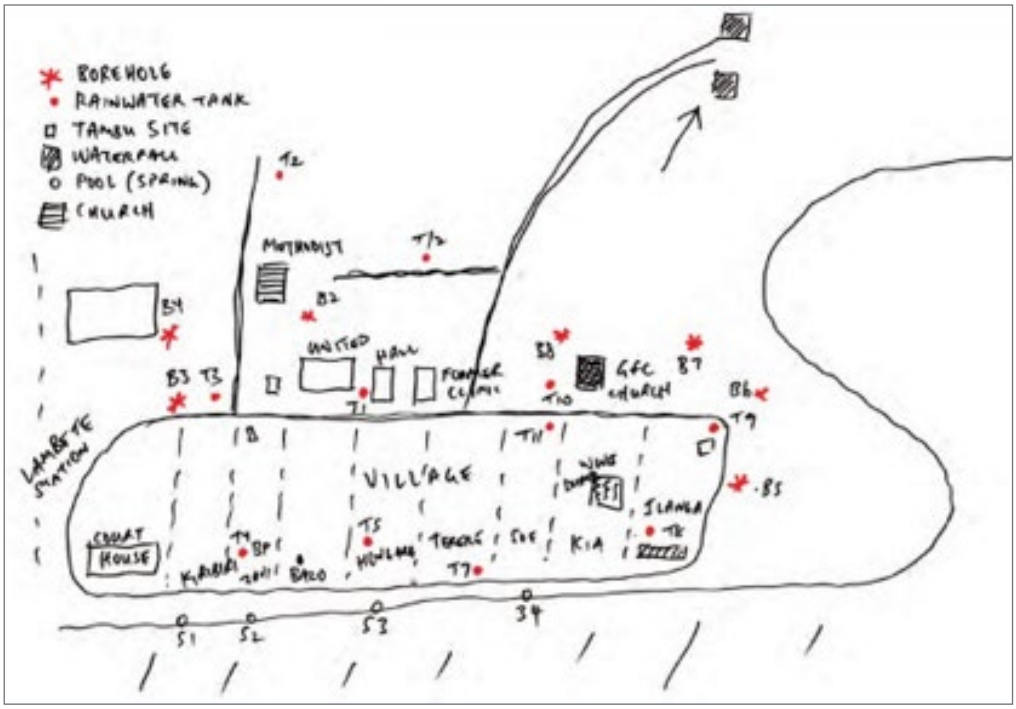

Figure 24 Example of a village map drawn by village members, showing main village landmarks (roads, churches, etc), main water sources and zones. (Image from: Regina Souter, IWC)

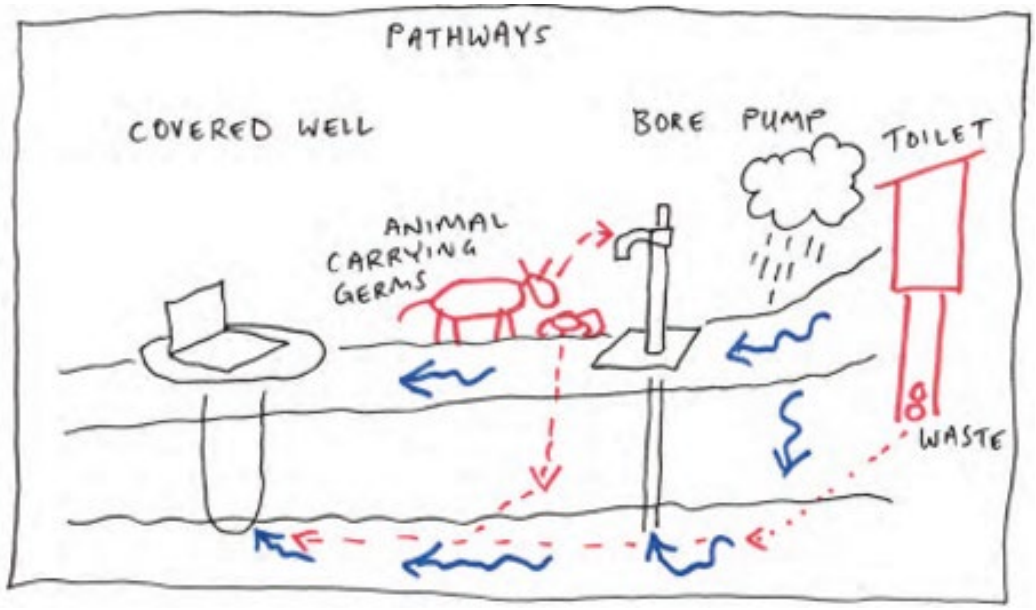

Figure 25 Water pathways – how water moves through the environment. (Image from: Regina Souter, IWC)

LIKELIHOOD AND EXPOSURE	SEVERITY		
	Low	**Medium**	**High**
High	Medium	High	Urgent
Medium	Low	Medium	High
Low	Low	Low	Medium

Figure 26 Risk assessments often consider the likelihood and exposure of the risk, along with the severity

STEP 2 – Identify control and mitigation measures

Following hazard identification, the next process of the water risks session is focused on what control and mitigation strategies could be applied.

A key question asked is ***'what can be done to remove the hazard, or reduce exposure and vulnerability to the hazard'?***

This provides an opportunity for the zonal representatives and their households to deliberate and discusses ways to remove hazards or to reduce exposure and vulnerability to hazards that cannot be removed.

An unprotected water source in one of the communities in the Solomon Islands. Unprotected water catchments have a high likelihood of contamination by people, animals, or vegetation debris. Image credit: Water for Women, Solomon Islands

An enclosed storage tank with a pipe that transports water to the village. Water is collected in a spring box and then piped into a storage tank. These types of structures are typical in most of the project communities. Image credit: Water for Women, Solomon Islands

A ferro-cement water storage used by the local communities. Project officers along with zone representatives, conduct physical checks on community water sources and storage. All information feeds into the risk and hazard identification process and feedback from zone representatives to households. Image credit: Water for Women, Solomon Islands

STEP 3 – Develop an action plan

The culmination of this activity is a facilitated process for the community to develop their own Action Plan. Through the risks and hazards identification process, zone representatives facilitate detailed conversations within their own zones.

A combined meeting is held with all four zonal representatives. Each zone representative shares their own zones risks and issues with the broader group. This information is then put into a table in the Action Plan, where the details are clearly specified.

Care is taken to make sure that clear language or imagery is used in the action plan so that it is accessible to all, regardless of literacy level.

Through this process, the community can discuss controls and how to implement them.

The action plan consists of three parts:

- **Part 1: Create a table** to capture the following (based on the results from the community meeting).
- **Part 2: Get SMART** (Specific, Measurable, Achievable, Realistic and Timely) goals.
- **Part 3: Create a table** expected change to capture how change to water management will happen.

After these components are outlined, the project leaders will share back with the community, contact authorities and/or define roles for implementation.

Why community members may not bring up issues?

Most times, water hazards and problems are known and acknowledged by the communities themselves. However, they are not brought up through their various meeting channels for a number of reasons, including:

- They don't feel empowered;
- There may not have been an open invitation for other gender groups and age groups to participate (e.g. women and girls or youths).
- Concerns about raising contentious issues such as logging or open defecation may exist.

This communication challenges make it very difficult for communities to collectively sit and deliberate on how to solve their community problems, such as water risks and how to go about it.

Community based water security improvement planning process allows a space for this open dialogue to occur.

Part 1: Create a table

Create a table to capture the following:

- What action is needed to mitigate and manage the risks and hazards (i.e. what we will do?)
- Who will do it (i.e. who will lead this action?)
- Timeframes (i.e. when to start and expected time to complete?)
- Resources (i.e. what money, skills are required to achieve / solve this issue?)

ACTION	WHO IS RESPONSIBLE	WHEN? START – COMPLETE	RESOURCE NEEDED

Part 2: SMART Goals

Participants are then encouraged to outline SMART goals. SMART stands for Specific, Measurable, Achievable, Realistic and Timely.

It is important to acknowledge that not everything will work according to plan.

Everyone has to remain flexible and adaptable as the agreed plan changes.

GOALS	ACTION	WHO IS RESPONSIBLE	WHEN? START – COMPLETE	RESOURCE NEEDED

Part 3: Expected change

An expected change component is incorporated into the plan to make it clear how changes will happen.

GOALS	EXPECTED CHANGE	ACTION	WHO IS RESPONS-IBLE	WHEN? START – COMPLETE	RESOURCE NEEDED

References and additional materials

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/playlist?list=PLa3eWR75XNLzLG6Pq_raFTTsnexGzDiZm

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Renn (2008) Risk governance: coping with uncertainty in a complex world. Earthscan, London.

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- **Anthony Nadelko (CSIRO)**
- **Donna Hayes (CSIRO)**
- **Tom Rankin (Plan International)**
- **Regina Souter (IWC)**
- **James Butler (CSIRO)**
- **Michelle Abel (Live and Learn)**
- **Mark Love (IWC).**


3. EGS-COWBe importance
• What is the importance of each EGS to the 4 CoWSe
➢Income
➢Health
➢Food security
➢Social cohesion
• Assume you had same quantity of each EGS
(e.g. box of palm oil seeds, box of fish, box of timber
How would be the importance of that EGS to the 4 COWSe
(1 no importance) to
(5 strong importance)

Participatory Monitoring, Evaluation and Learning (MEL)

With this tool, you will learn:

1. **What is participatory evaluation and how it can help your projects**
2. **How to undertake participatory evaluation**
3. **What skills and competencies you might need**

What is participatory evaluation?

Participatory reflection workshops or exercises involve working with your team and key stakeholders (these could include partners, beneficiaries and funders). The exercise aims to review an activity or process, outputs, outcomes or impacts, or some combination of these. The output of this exercise will be stories of success, and a set of lessons learnt (barrier, gaps, things to improve on), enabling adjustments to your activity or project moving forward.

> "While we are living in the present, we must celebrate life every day knowing we are becoming history with every work, every action, every deed." — Mattie Stepanek

Why do a participatory evaluation?

We do participatory evaluation to learn from our experiences within a certain project. In a rapidly changing world, learning from our own processes is important to help us make better decisions.

Implementing effective participatory evaluation can be time and resource-intensive, but the benefits are worth the effort, as the outputs of effective monitoring evaluation and learning can be used to:

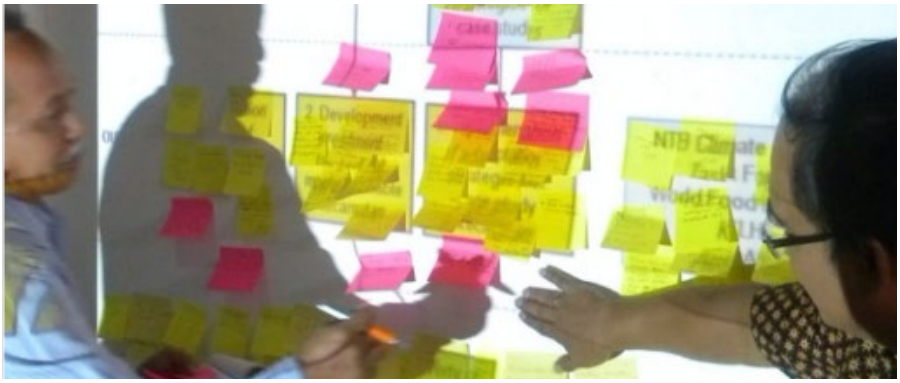
- Improve the implementation of the project.
- Design a better project next time.
- Demonstrate accountability, value, and impact to your stakeholders and funders.
- Create stories of change to share with others.
- Create change within your colleagues and institution.

Like Tok Stori and Talanoa, Monitoring, Evaluation and Learning, when done in collaboration with communities and stakeholders, can increase efficacy; enable critical, strategic and future thinking; and be empowering even when things don't go to plan.

It helps to build resilience by showing how problems are solved. MEL can also be used to remember and celebrate the good things that happen, which is important for knowledge brokering.

How to do a participatory evaluation

There are many ways of doing a participatory evaluation, including using Tok Stori and Talanoa outlined in the MEL module (Volume 1). Below you will find a step-by-step description of one example process for participatory evaluation mapping.



Example of participatory evaluation mapping

STEP 1 – Open with a reflection on the project/program to bring all participants up to speed.

For example, some of the following questions are useful:

- What was/is the goal or objective?
- What skills, tools or capacity was the project or program trying to grow?
- What were the project outputs? (reports, numbers trained, etc.)
- What were the anticipated outcomes and impacts?

STEP 2 – Draw a line on a whiteboard

Project a slide on a wall or scratch a line into mud or sand.

Scratching a line in the sand

STEP 3 – Explain what you would like participants to 'plot' on the chart

PLOT:

- items on the line to reflect whether expectations have been met,
- items above the line exceed expectations, and
- below the line are not meeting expectations.

PLOT ITEMS:

- processes
- outputs
- outcomes
- impacts

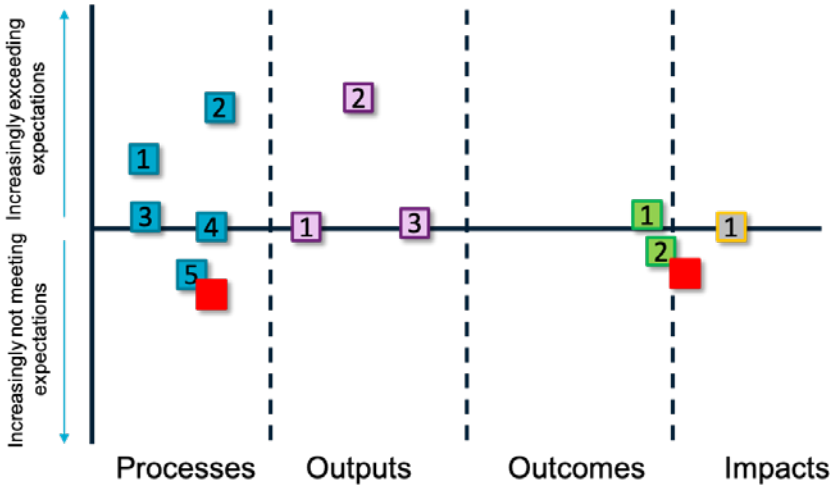


Figure 27 Example plotting on, above and below the line

Use 'Turn and Learn'

Turn and learn allows for all voices to be heard and to see the range of responses enabling collective learning via discussion about who put their item below the line and why.

The process is as follows:

1. Start by getting participants to have a post-it note or pebble – Everyone should have a post-it per item (e.g. engagement with community, training in GIS, scaling product with farmers) to allocate that item above or below the line as they think.
2. Then ask your first question, such as how did you find the workshop activity? Did it meet your expectations, exceed your expectations or not meet your expectations?
3. Get participants to think about their own answer quietly, and if using post-it notes, get participants to write their answer and why they thought this on the post-it note.
4. When everyone is ready, get people to put their post-it note or pebble where their answer fits (above, on, or below the line).
5. Once all answers have been place you can get people with answers clustered together to explain why they responded the way they did. This way, you better understand the range of responses and can collectively decide how you would like to score that activity.
6. After finishing that discussion, you can ask the following question and repeat the process.

TIPS:

It can be helpful to use different coloured sticky-notes for process, output, outcome, and impacts and highlight challenges or barriers (i.e. in red).

If literacy or access to resources is a challenge, use an object instead of post-it notes, such as pebbles.

Summary

Participatory evaluation mapping can be repeated over the life of the project/ program to see how it is tracking, make activity adjustments, and facilitate individual and collective learning.

What skills and competencies are needed to facilitate participatory MEL?

A knowledge broker will require many key competencies to create and implement a monitoring, evaluation and learning activity. Perhaps the most important are interpersonal and learning competencies, which will help cultivate individual and group learning.

In addition, systems thinking and critical thinking will allow you to attribute the associated impacts of your activities with project intervention steps; and integration and strategic thinking will help you draw insights together and develop a clear and logical articulation of impact and lessons learnt for funders, stakeholders and other audiences.

Additional resources

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/watch?v=beIXYMueFtk&t=799s

If you want to learn more about MEL, the internet has many good resources. Below are two useful links you can start with:

https://www.clearhorizon.com.au/collaborate to create change for people, communities, and the environment.

https://unesdoc.unesco.org/ark:/48223/pf0000186231 a guide for monitoring and evaluating community-based projects.

Acknowledgements

This module was developed by:

Seona Meharg (CSIRO): an integration scientist focused on the capacities and competencies needed for systemic change, and with experience in research evaluation and project management for transdisciplinary projects.

Michaela Cosijn (CSIRO): an innovation broker who works in international development programmes solving complex problems and enhancing livelihoods, with her work focused on agri-food innovation systems, gender integration, and climate adaptation.

James Butler (CSIRO): a sustainability scientist with a background in agricultural economics, terrestrial, freshwater and marine ecology gained in southern Africa, Europe and Australia.

Samantha Stone-Jovicich (CSIRO): an anthropologist with an interest in strengthening science's contribution to on-the-ground impacts and a focus on complexity-aware monitoring, evaluation and learning (MEL) frameworks and tools to critically assess current research approaches and practices and to foster experimentation with new ways of thinking and practice to better bridge science and meaningful, lasting social change.

Theory of Change

With this tool, you will learn:

1. **What is Theory of Change and how it can help your projects.**
2. **How to develop a Theory of Change.**
3. **What skills and competencies you might need to develop a Theory of Change.**

Theory of Change

A Theory of Change is a mental model of how change is anticipated to happen, and it helps you plan for the future and anticipate barriers or challenges.

A Theory of Change:

- Is both a process and a product (an illustration and/or a narrative) that articulates how and why a desired change is expected to happen in a given context.
- Maps out what has been described as the "missing middle" between what a program or change initiative does (activities or interventions) and how these lead to desired impact and goals being achieved.
- Is not a social or scientific theory of change (although it would be good to include them!)

Why create a Theory of Change

The process of developing a Theory of Change with your partners and key stakeholders can help you to:

- Create a shared vision and understanding of the impact you want to achieve.
- Articulate and share your assumptions about how the project or activity will be undertaken and how you anticipate change will occur.
- Understand your context and who will need to be engaged with to help activities and the project succeed.
- Map out the steps needed to plan your project and associated activities.
- It supports planning and decision making
- Develop a MEL framework by understanding what data you need to collect to test your assumptions and assess progress. The Theory of Change, together with your learning framework will enable you to adjust your project as you understand what works, what doesn't, and why. It can also help you measure and communicate your impact to your stakeholders and funders.
- Learn and improve or change your processes and assumptions for the next project or for scaling your existing activities.

Visualising a Theory of Change

Theory of Change can be drawn in many ways. There are different ways to visualise a Theory of Change or a living road map which will be shaped by the people who pull the diagram and change narrative together and the audience it is for.

The most important aspect is to articulate the assumptions in each step and be aware that there is decreasing confidence in your ToC over time. The image (fig 28) shows this as a one-way pathway for simplicity, but you would really expect to see feedback loops which is critical to your ToC, as learning and testing your assumptions are key.

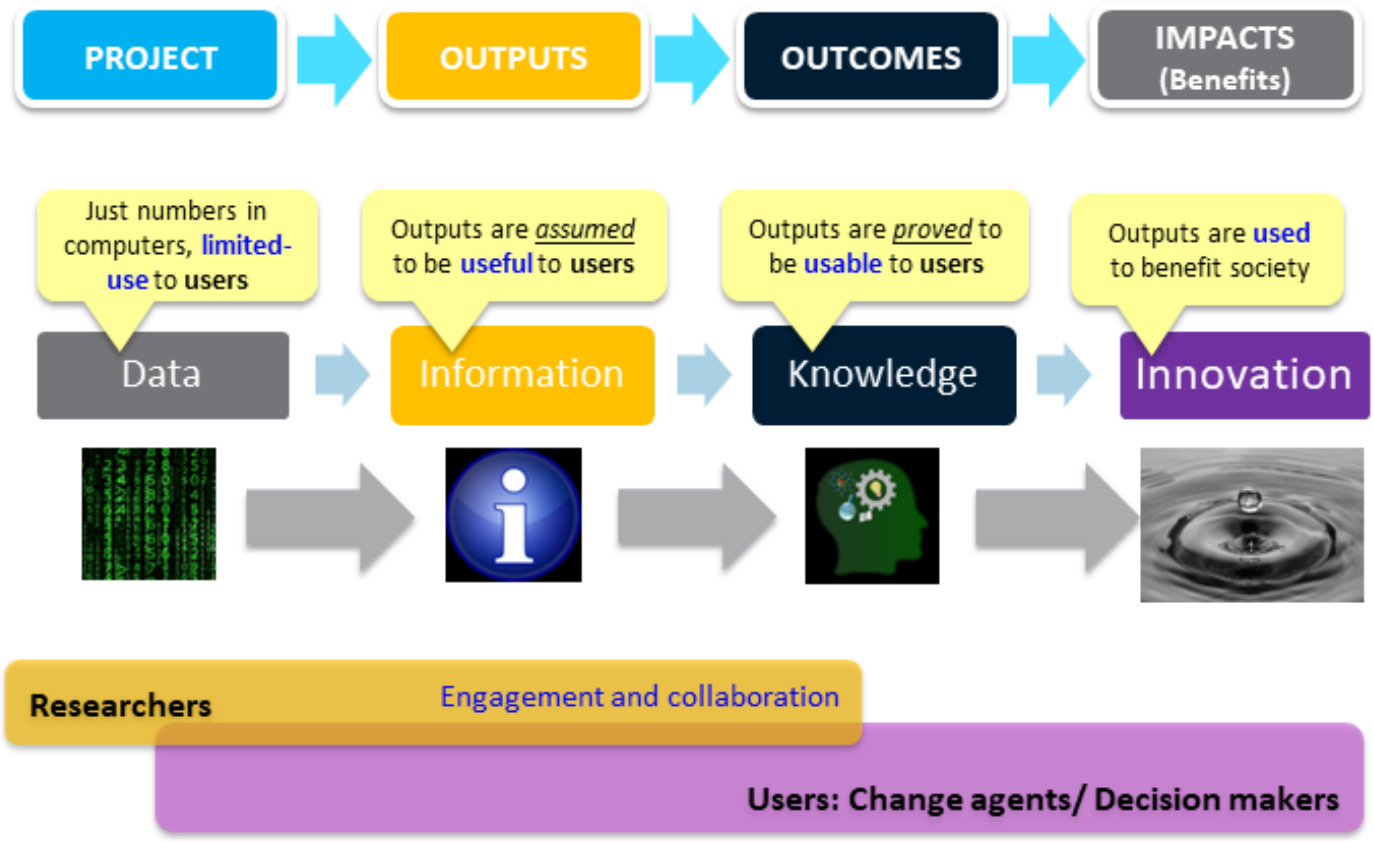


Figure 28 The visualisation of the elements that make up a Theory of Change (Image credit: Minh Nguyen (CSIRO))

How to create a Theory of Change

There is no 'right' or best practice way of developing a Theory of Change. It is a flexible and iterative process and pathway that helps you navigate through to your goal.

Key tips for developing include:

- The approach you take will depend on the context, project and participants.
- A Theory of Change can't cover everything. Rather go with the 80/20 rule (roughly 80% of the effects come from 20% of the causes, so focus on the 80%).
- Be mindful of the context and your assumptions, and windows of opportunity.
- Sometimes Theory of Change can be misused by thinking it is an inflexible map for control and management, which can lead to an accountability and planning focus, rather than a tool for reflexive learning.

Ultimately, the story of the impact pathways developed through the process becomes more useful for the team and stakeholders and for creating the learning framework.

Step 1: Understand the context

A ToC often starts with a vision, but before you get to the vision, you must have at least a basic understanding of the context you are working in. Whether that is in a foreign country or a community you are not familiar with or about the field or domain you are working in. For many places, as you would be aware in your own community, this also includes the historical context (what has happened before you).

You need to understand and be able to clearly communicate:

- Why are you doing what you are doing, and what are the "whys" of the people you are working with?
- Where are you hoping to work? What is happening here now (other than your project)? What has happened in the past?
- When would you like to do this work? When is your window of opportunity for change?
- Why are you doing what you are doing, and what are the "whys" of the people you are working with?
- Who needs to be involved, consulted etc?
- What are you trying to achieve (goal)? What do others hope to achieve?
- How do you hope to do the work?

Step 2: Develop a shared vision

With the people identified in the "who" in Step 1, develop a shared vision for the impacts of the work and what the project will achieve (goal) that helps you achieve the vision.

Developing a vision is a critical step as it starts the process of shared ownership of the project process and outputs, and can break down barriers between groups by focusing on what both want.

Draw their vision. Write it. Tell a story.

When it is done it is important to record all the attributes of the vision that are desired.

Figure 29 Example of a vision developed in East New Britain, Papua New Guinea

Step 3: Sequencing steps towards the vision

Start adding the 'stepping stones' needed to get from where you are to the vision.

This is often best done working backwards from your vision and goal, outlining:

- Long-term impacts
- Medium-term outcomes and impacts
- Short-term outcomes
- Activities and associated outputs

Step 4: Make assumptions and agendas explicit

While you are adding the steps, it is important to make your assumptions and agendas explicit.

This helps you build a more robust program of work and get a better understanding of your partners.

Types of assumptions can include:

- planning and timing of activities
- who should be / needs to be involved
- mental models or theory about why one step will lead to another, which leads to an impact

Articulating these assumptions will help you better understand yourself, your partners and your stakeholders and inform you what to test in your monitoring, evaluation and learning framework.

Not articulating your assumptions or misplaced assumptions of what was possible/needed can lead to costly replanning, no change or maladaptive outcomes.

CSIRO and TNC teams creating a Theory of Change

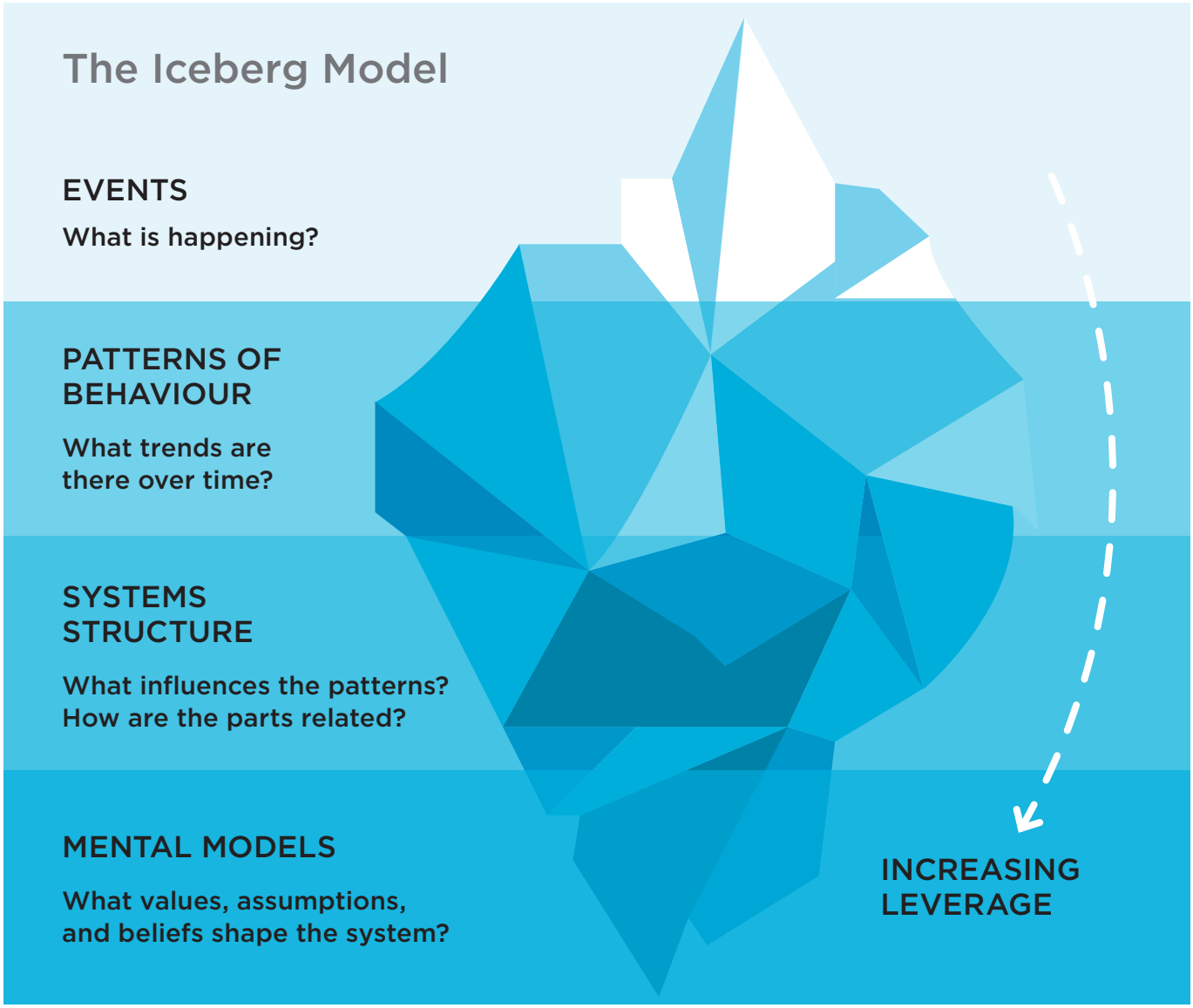


Figure 30 Good practice in Theory of Change requires considering all levels of the iceberg

Not only the tip of the iceberg...

In addition to making your assumptions and agendas explicit, it is worth identifying the underlying systemic structures (below the water line) you need to account for building steps to your goal.

These include thinking about:

- what may be already in place that might prevent your project from working or create mal-adaptations
- potential more impactful leverage points that would be more effective to create change, such as: events; patterns of behaviour; system structures; mental models etc.

Just like an iceberg, 90% of which is invisible beneath the water, these structures are often hidden below the surface.

However, if you can identify them and connect them to the events that you are seeing, you may be able to develop lasting solutions that target the whole system rather than short term, reactive solutions.

What skills and competencies are needed?

A knowledge broker will require many key competencies to create a Theory of Change.

Of particular importance are the **interpersonal competencies** required to facilitate a group of people to co-create a theory of change as well as facilitation skills and openness to other perspectives.

- **Learning and openness competencies** will help you see novel pathways forward and address barrier identified.
- **Future thinking** and **normative thinking** will help you to facilitate the cultivation of the vision which is an essential early step.
- **Systems thinking** and **critical thinking** will help you map the impact pathways, ensuring there are no unintended consequences of your activities and that you are including the necessary set of stakeholders addressing the appropriate intervention points.
- **Integration and strategic thinking** will help you pull the pathway together and develop a clear and logical set of steps to implement your theory of change.
- **Being able to hold with ambiguity** allows you to progress without getting caught up in not knowing.
- A little **entrepreneurial or creative competency** will help thinking outside of the box to create the change you seek.

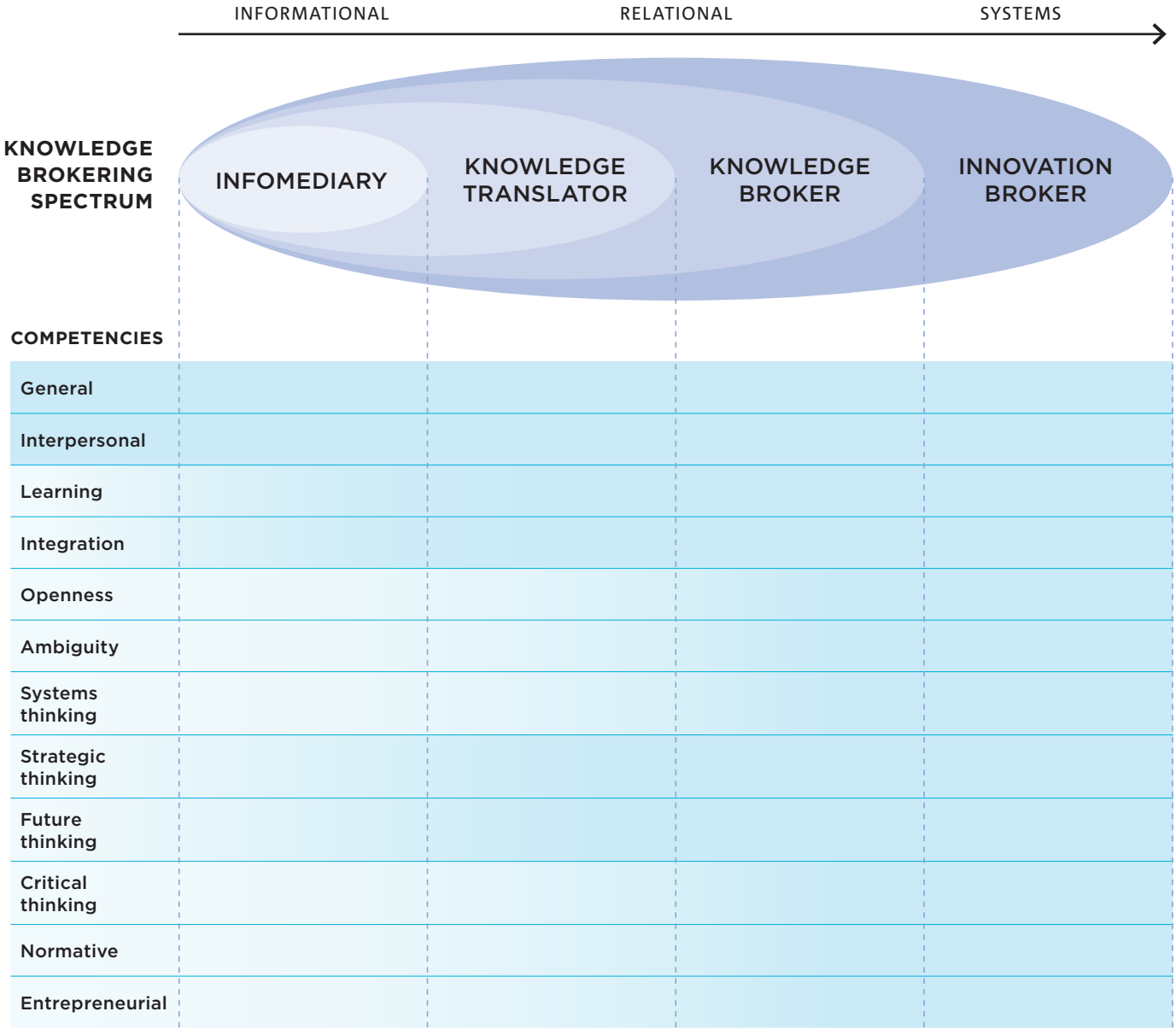


Figure 31 competencies by knowledge broker type

References and additional resources

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/watch?v=beIXYMueFtk&t=799s

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Acknowledgements

This module was developed by:

Seona Meharg (CSIRO): an integration scientist focused on the capacities and competencies needed for systemic change, and with experience in research evaluation and project management for transdisciplinary projects.

Michaela Cosijn (CSIRO): an innovation broker who works in international development programmes solving complex problems and enhancing livelihoods, with her work focused on agri-food innovation systems, gender integration, and climate adaptation.

James Butler (CSIRO): a sustainability scientist with a background in agricultural economics, terrestrial, freshwater and marine ecology gained in southern Africa, Europe and Australia.

The Wellbeing Tool – Assets Drivers Wellbeing Interaction Matrix (ADWIM)

This module will introduce you to a tool called the Assets Drivers Wellbeing Interaction Matrix (ADWIM). It was developed to support community and regional planning for climate change adaptation and development planning.

In this module, you will learn:

1 **What is ADWIM?**

2 **Why use ADWIM?**

3 **How ADWIM works**

4 **What are Ecosystem Goods and Services (EGS)?**

We will also provide an example of the ADWIM process used with Huhu Local Level Government (LLG) Papua New Guinea, including some results.

What is ADWIM?

ADWIM stands for Assets Drivers Wellbeing Interaction Matrix.

It is a tool that can be used to value ecosystem goods and services (EGS) and assess the impact of drivers such as climate change and population growth on the EGS and community wellbeing.

It was developed to help communities and regions plan for the future. The analysis is usually focused at the community level, but can be applied at any scale, and also can be used for different social units such as gender or age groups.

ADWIM was developed for application primarily in remote and/or rural settings to help with projects focused on community and regional planning for climate change

What is my community's natural resource reliance, and how will this be impacted in the future by drivers such as climate change and population growth, and what can we do about it?

ADWIM was developed by CSIRO and has been applied to many projects in Papua New Guinea, Indonesia, the Solomon Islands and Fiji. It has also been used in a multi-jurisdictional context in the Torres Strait, and in a semi-urban setting in South-East Queensland, Australia.

The ADWIM tool has also been developed to allow the integration of different sources of knowledge:

- **Scientific knowledge** – How are drivers going to change in the future, and what is the impact of those changes on habits and ecosystem goods and services?
- **Local knowledge** – What are the ecosystem goods and services utilised by communities, and what is their importance to human wellbeing?

Why use ADWIM?

ADWIM can support community adaptation strategies and prioritise interventions for aid and development programs.

ADWIM can be used in participatory planning for designing community adaptation activities. It can answer two questions:

1. **Which natural resources are important to your local community's wellbeing?**
2. **How are these natural resources going to be impacted in the future?**

In planning workshops, stakeholders can then prioritise strategies to tackle the specific drivers of future impacts on the most highly valued EGS or diversify by utilising EGS, which will be less impacted by future change.

Transparent

- Values easily identified by stakeholders
- Information sources clearly defined

Relevant

- Outputs designed for existing processes
- "System approach" based on all of the natural resources used now and in the future

Replicable

- Methods and assumptions well documented
- Simplicity allows rapid assessments

Credible

- Easily cross-checked by stakeholders
- Integrates local and scientific knowledge

Types of ecosystem goods and services (EGS)

One way to categorise the benefits that humans derive from ecosystems is through four types of EGS. These were defined by the Millennium Ecosystem Assessment (2005) as provisioning, cultural, regulating, and supporting.

While all types of EGS are important, the ones that ADWIM focuses on are the benefits derived from the direct utilization of ecosystems.

This combines the Millennium Ecosystem Assessment's classification of 'provisioning' ecosystem services (products obtained from ecosystems) and 'cultural' ecosystem services (non-consumptive benefits). It does not include the 'regulating' benefits obtained from the regulation of ecosystem processes (coastal protection, water purification and carbon sequestration) or 'supporting' services (those necessary for the production of all other ecosystem services).

The importance of EGS are estimated from their contribution to the Constituents of Wellbeing:

1. **Food**
2. **Income**
3. **Health**
4. **Culture**

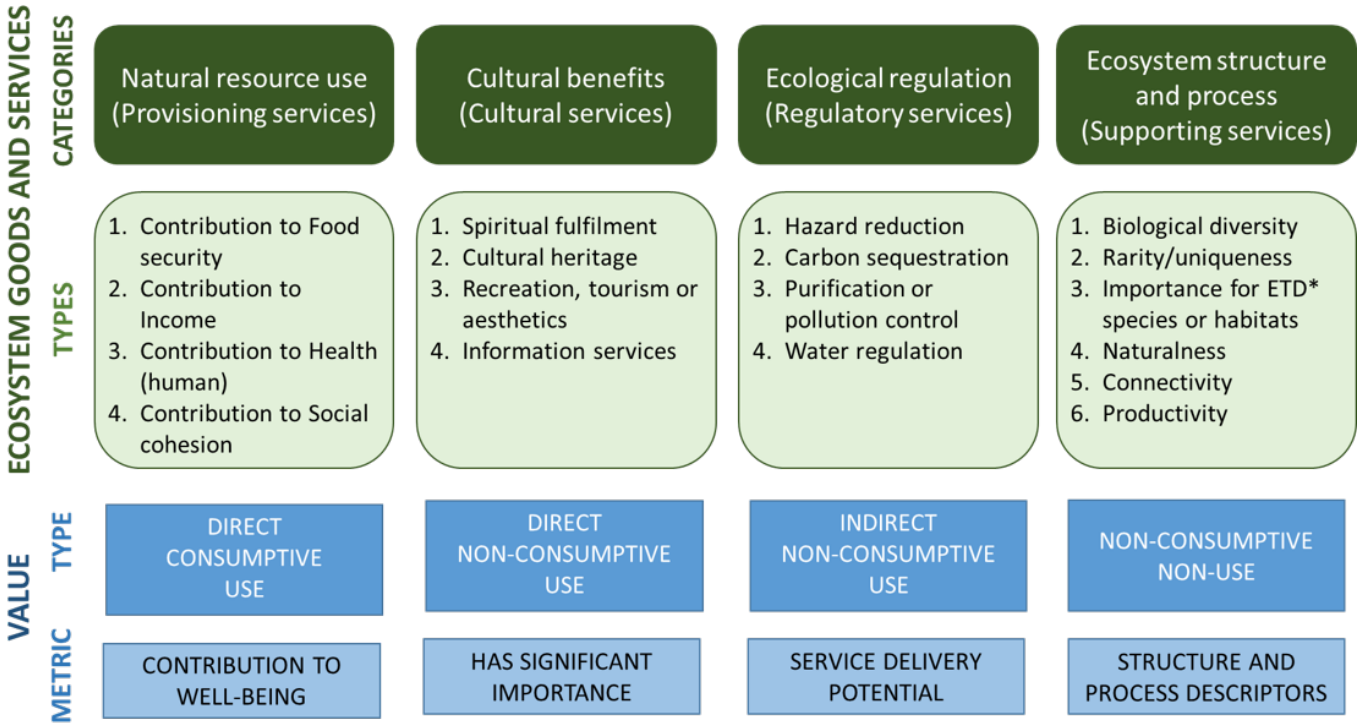


Figure 32 Ecosystem Goods and Services (EGS): their Categories, Types, and ways they can be valued

How does ADWIM work?

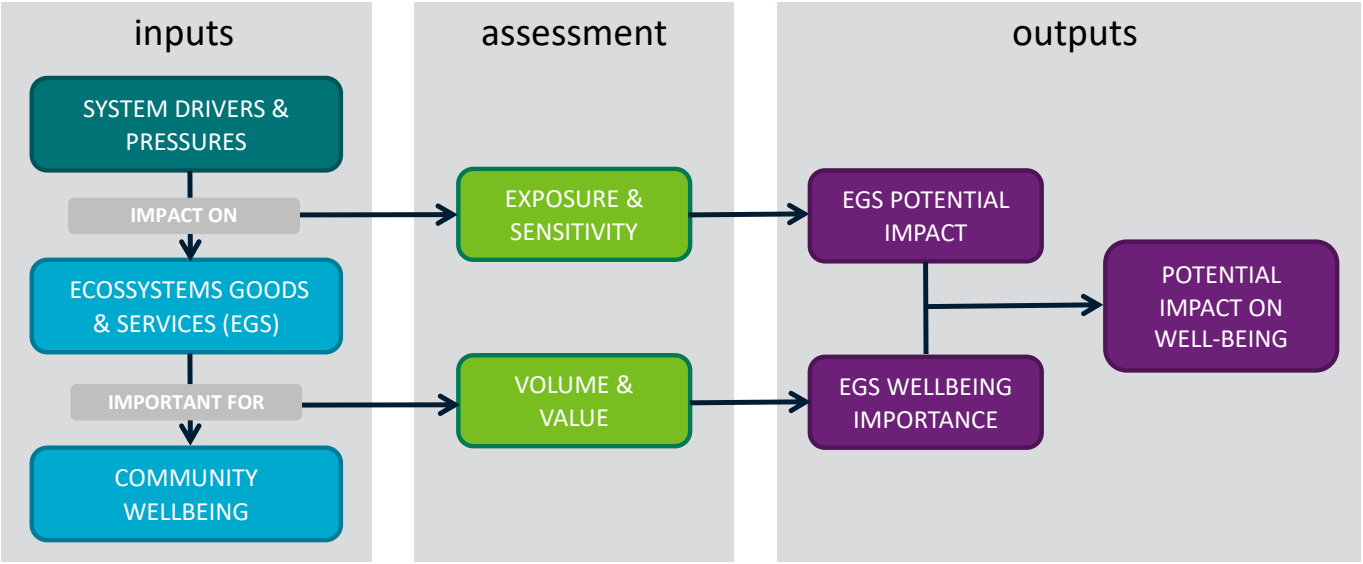


Figure 33 An outline of the ADWIM Tool

ADWIM is set up in Excel spreadsheets which can be populated with data in real time in workshops.

The first part estimates the potential impact of the system drivers and pressures on local EGS, which is based on the exposure and sensitivity of the ecosystem assets that supply the EGS (e.g. animal populations and their supporting habitats) to each pressure.

The second part estimates the importance of each EGS according to their volume utilised and relative value to community wellbeing.

Inputs

SYSTEM DRIVERS & PRESSURES Projections of current and future system drivers (especially climate change and population growth) and their associated pressures (such as temperature change and utilisation).

ECOSYSTEMS GOODS & SERVICES (EGS) The local ecosystem goods and services (EGS) directly utilised by communities.

COMMUNITY WELLBEING The benefits provided by local EGS to communities, measured by four 'constituents of wellbeing': food security, income, health and culture.

Assessment

EXPOSURE & SENSITIVITY The impact of the system drivers and pressures on local EGS as a result of the exposure and sensitivity of the underlying habitats (or 'assets') that generate the EGS.

VOLUME & VALUE The overall importance of each EGS for the wellbeing of the community is assessed in terms of its volume utilised and its relative value to wellbeing (i.e. through food security, income, health and culture).

ADWIM outputs include:

The three main outputs from ADWIM that are used by stakeholders for adaptation and planning are:

1. **The EGS Potential Impact** – changes in EGS due to Pressures
2. **EGS wellbeing importance** – the importance of each EGS as a proportion of overall EGS-derived wellbeing
3. **Overall wellbeing impact** – the impact of all Pressures on all EGS as a proportion of overall EGS-derived wellbeing

Output 1: EGS well-being importance

Valuing EGS is a critical first step of ADWIM because:

1. Remote communities generally have a high reliance on local natural resources.
2. The natural resource base for many remote communities is not well known.
3. The elicitation of EGS values provides a good opportunity to engage community members, build trust and co-produce new knowledge.

Below is an example of the EGS valuation output from the Mangoro Market Meri project in Milne Bay Province, Papua New Guinea. The results show the relative value for communities in Huhu Local Level Government (LLG) area, elicited by The Nature Conservancy.

It shows the top 30 EGS (there are 62 in total), divided between the four constituents of well-being – income, health, food security and culture.

Garden staple foods make up the top five EGS, illustrating the importance of gardens to these communities. Compared to the other EGS, which were important in terms of income, health, food security and culture, betel nut was mostly important for income and culture.

More on the Mangoro Market Meri case study demonstration of ADWIM can be found - (https://learnwithacfid.com/mod/ scorm/view.php?id=702).

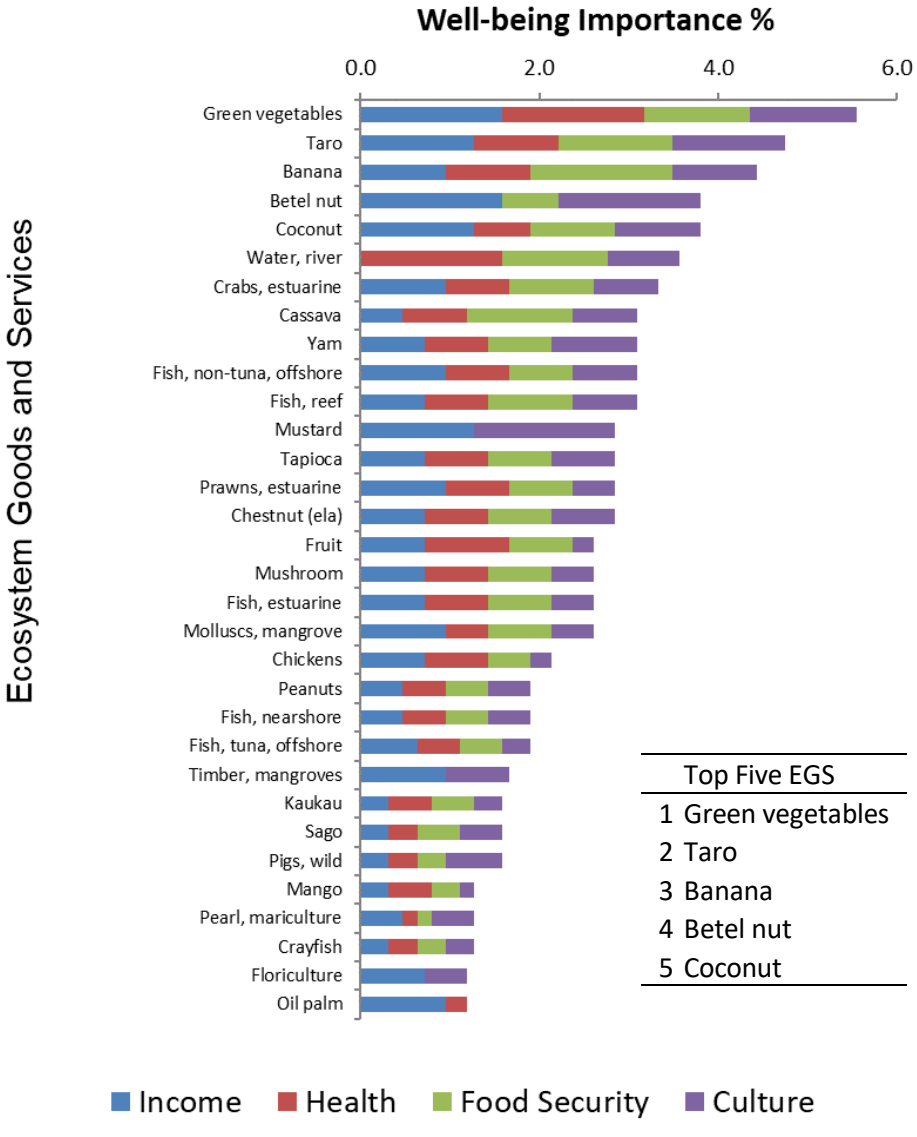


Figure 34 EGS importance from Huhu LLG villages, Milne Bay, PNG

EGS Habitats Well-being Importance

The values can also be totalled by habitat to show their relative importance.

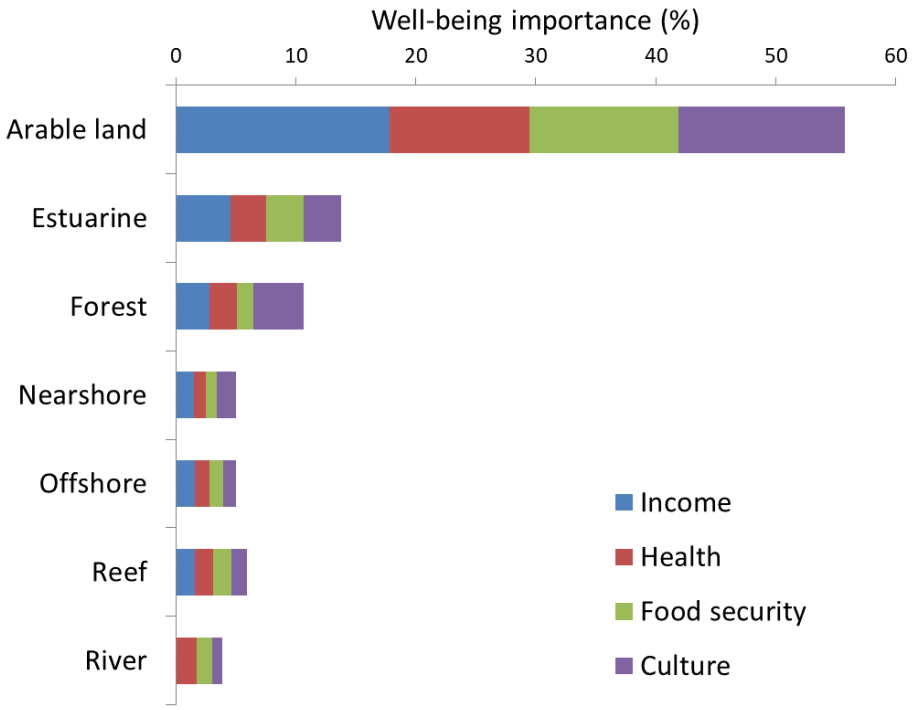


Figure 35 EGS habitats well-being importance – this Huhu LLG example shows the importance of gardens (i.e. arable land) to community wellbeing.

EGS Habitats Relative Wellbeing Importance

If you have estimates of the area of the different habitats for the focus community, you can also present a relative value for habitat (e.g. per km2).

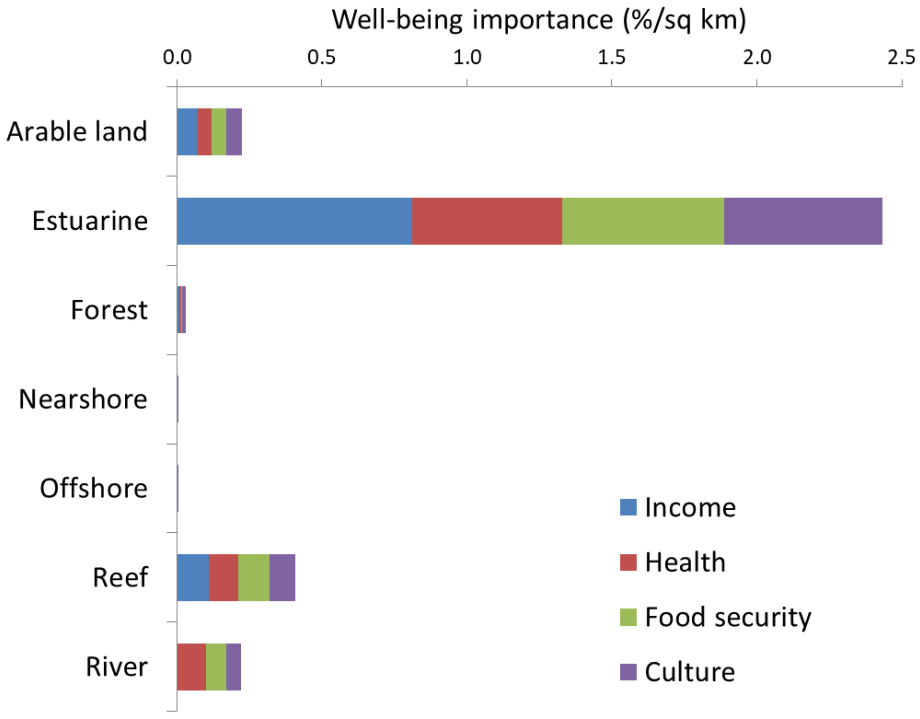


Figure 36 An example from Huhu LLG and is a typical indicator of the relatively high importance of estuaries for wellbeing for coastal communities, because their area is small but the overall value of EGS derived from this habitat is high

Output 2: EGS Potential Impacts

The second part of ADWIM is an estimate of future impacts on EGS. This is done using scientific knowledge or expertise to estimate the impact of each pressure on each EGS as a percentage of the overall status of that EGS.

This diagram shows an example of the EGS Impact outputs for Huhu LLG in PNG.

The graph below shows the importance of local EGS (Output 1) side-by-side with the estimates of potential impact by 2030 and 2050 (as a percentage of the overall status of that EGS), differentiated by each pressure. Although there are some positive impacts on most EGS from temperature increase in the short term, most of the impacts are negative.

You can see from this example, again for Huhu LLG, that the greatest and most relevant impacts relate to the estuarine crabs and reef fish EGS, caused by projected overexploitation and the effects of temperature increase.

However, most agricultural EGS are not predicted to be greatly affected (e.g. garden staples), and some EGS may even provide options for livelihood diversification because they will be relatively less impacted by future changes (e.g. sago & kaukau).

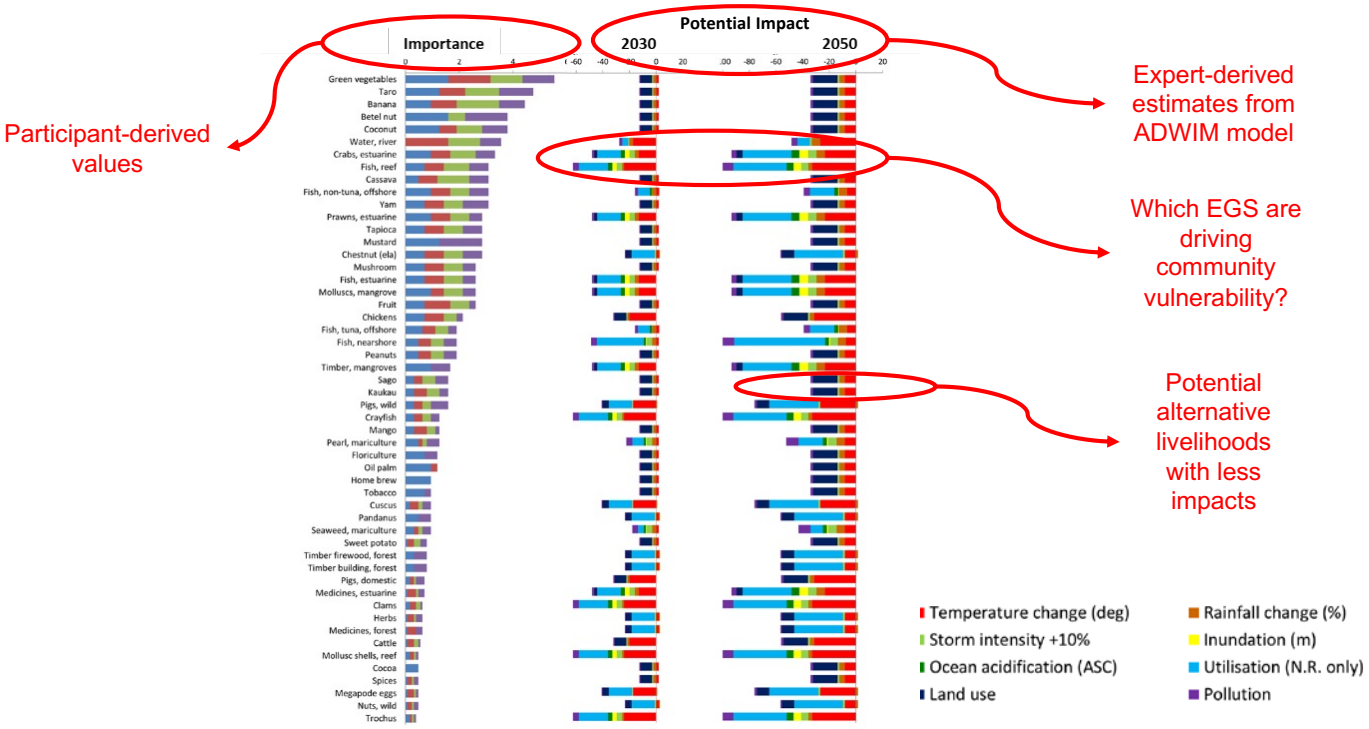


Figure 37 EGS importance and potential impacts Huhu LGG, Milne Bay Province, PNG

Output 3: Overall wellbeing impact

The third output from ADWIM is a combination of the EGS importance and impact outputs – an estimate of the overall potential impact on community well-being.

Again, this example is from Huhu LLG in PNG. It shows that a moderate impact by 2030 becomes a significant impact on overall community wellbeing by 2050. This analysis indicates that temperate increases, over-utilisation and land-use changes are likely to be the primary pressures that will cause this impact, unless adaptation and mitigation strategies are introduced to address these pressures.

Remember that this is for the 'Business as Usual' situation for drivers and pressures, and does not include future adaptation actions. Remember that this can sometimes be confronting to local stakeholders when they see this information.

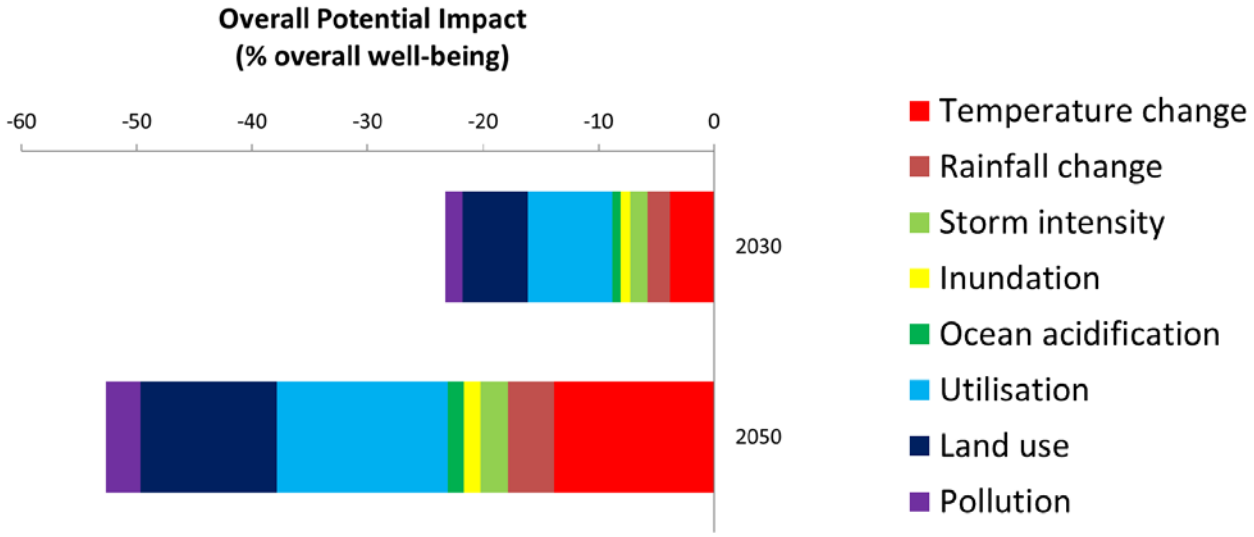
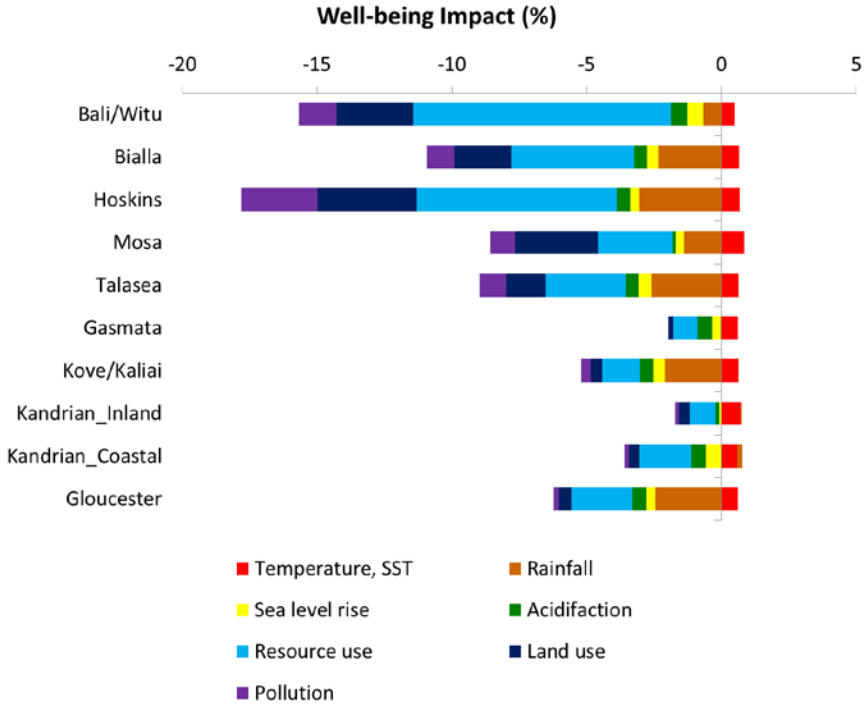


Figure 38 EGS Overall Wellbeing Potential Impact, Huhu LLG villages, Milne Bay, PNG



Comparing locations

If you are assessing several communities in the same region, then the overall well-being impact can provide relative impact information to help identify priority locations for action.

Figure 39 is an example for West New Britain in PNG.

It shows that the highly populated LLGs of Bali-Witu and Hoskins are likely to be the most impacted LLGs by 2030, caused by pressures related to human population growth, primary resource use, pollution and land-use change.

Figure 39 Comparing wellbeing impact in several locations

Undertaking an EGS well-being importance assessment

This section provides an introduction to the EGS wellbeing importance assessment part of ADWIM.

In the video below Tim Skewes and Nicky Grigg explain the process of estimating EGS values. After the video, you'll find a detailed explanation of each of the steps.

Watch video here: https://youtu.be/hoJBmvAUsXM

Pre-workshop

STEP 1 – DECIDE YOUR FOCUS COMMUNITY

Your focus community will usually be a combination of:

- The area (village, local government area, provincial government area, etc.); and
- The social groups within the community (e.g. everyone, women, youth, people with disabilities, etc.)

STEP 2 – FORMULATE AN INITIAL EGS LIST

Having a reasonably comprehensive but concise list of EGS before carrying out community elicitation is important, otherwise it might take too long to carry out the participatory process:

Consider the EGS that are utilised by the focus community within your geographical area over the past 3 years. Use any information you have at hand, or interview people with knowledge of the area.

Aim for a list of 30 or fewer EGS that include the most important EGS. In the ADWIM EGS valuing tool, there is a list of all the previous EGS CSIRO has collated from other areas of Melanesia. You can use this as a basis to formulate your initial EGS list.

STEP 3 – PLAN THE WORKSHOP

Planning for and carrying out the elicitation process will require some careful preparation.

Decide on the elicitation approach you are going to take to compile the EGS list and values.

It's important to be aware that there are knowledge brokering skills that you will need to facilitate workshops or focus groups and to elicit knowledge from local stakeholders. These may include interpersonal and communication skills, active listening skills, strategic thinking, openness, dealing with ambiguity and integration.

You may wish to use an external facilitator if it is a particularly contested situation or if it is difficult for you to maintain a high level of independence.

To set up a successful elicitation process, it is important to be aware of issues such as effective sample size and bias. If too few people are engaged, the results may not represent a wide enough range of views, and be biased.

STEP 4 – PREPARE EGS ELICITATION MATERIALS

The material you will need to carry out the elicitation process are:

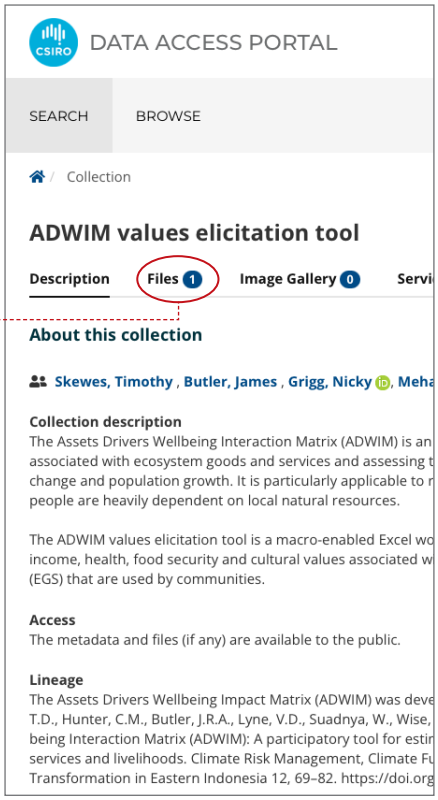
- A presentation to explain to participants the background and EGS scoring process.
- Print outs of the EGS scoring sheets for participants to fill in by hand.
- The ADWIM Tool Excel file and the Instruction Manual **[Files]**.

TOOL: Please access the ADWIM tool through CSIRO's data access portal: https://doi.org/10.25919/fpgq-6p71

STEP 5 – SET THE NUMBER OF GROUPS

Decide on the number of groups or individuals you would like to engage with. Usually, in a workshop setting, we would suggest 4 or 5 groups of people. If interviewing individuals, you may need to have 6 or more.

In the ADWIM EGS valuing tool, put the number of groups in the **relevant box** on the Instruction sheet.



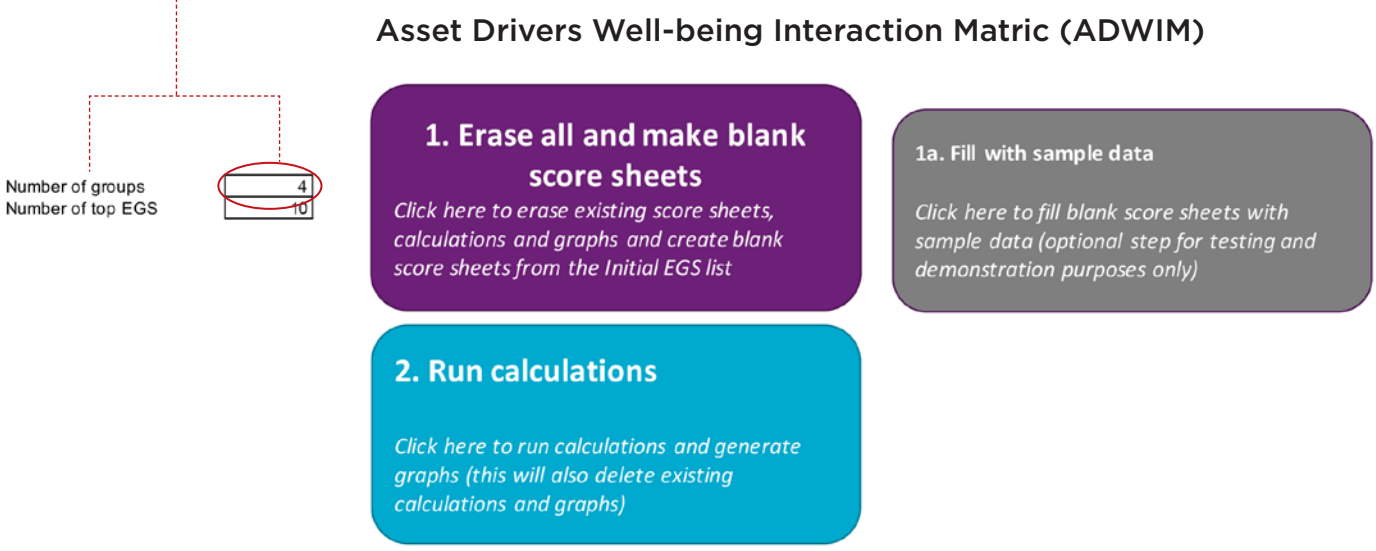


Figure 40 Image of the ADWIM tool

During the workshop

Before you elicit scores from participants (in a workshop or interview situation), you can use a graphic such as this one below to explain how well-being importance for each EGS is estimated.

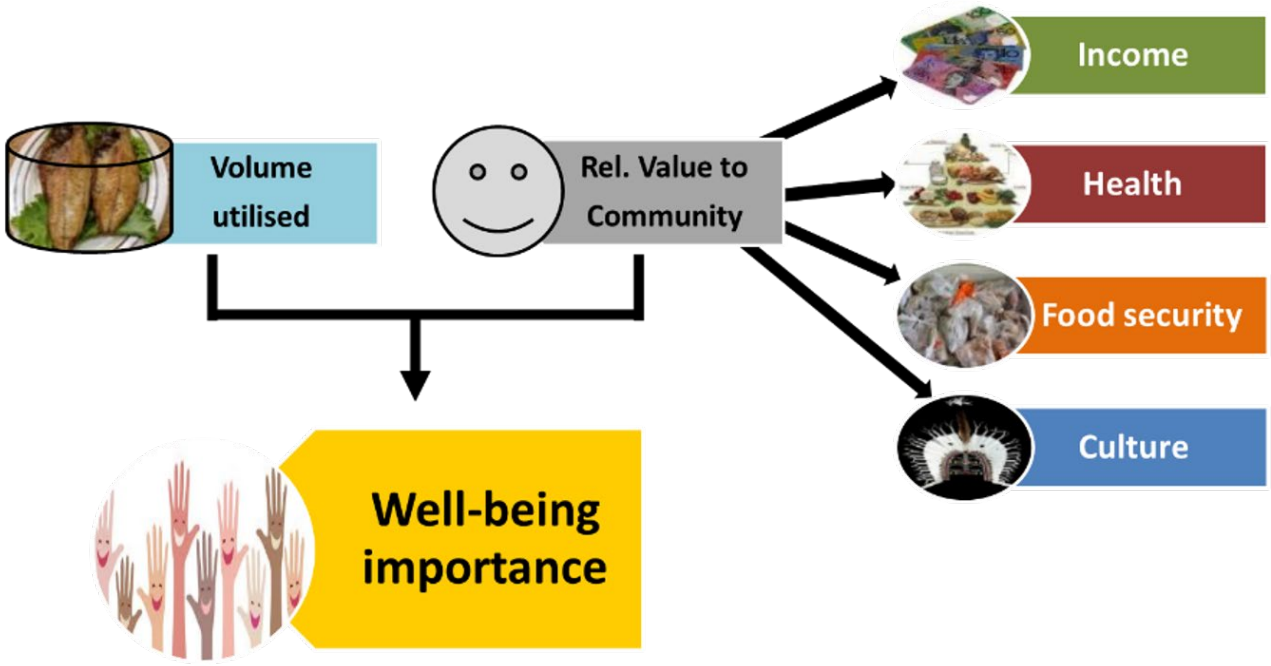


Figure 41 A graphic to explain the process of estimating EGS well-being importance

It is also important to explain to stakeholders that only ecosystem goods and services harvested from local ecosystems are to be considered, not those imported from elsewhere or purchased from others.

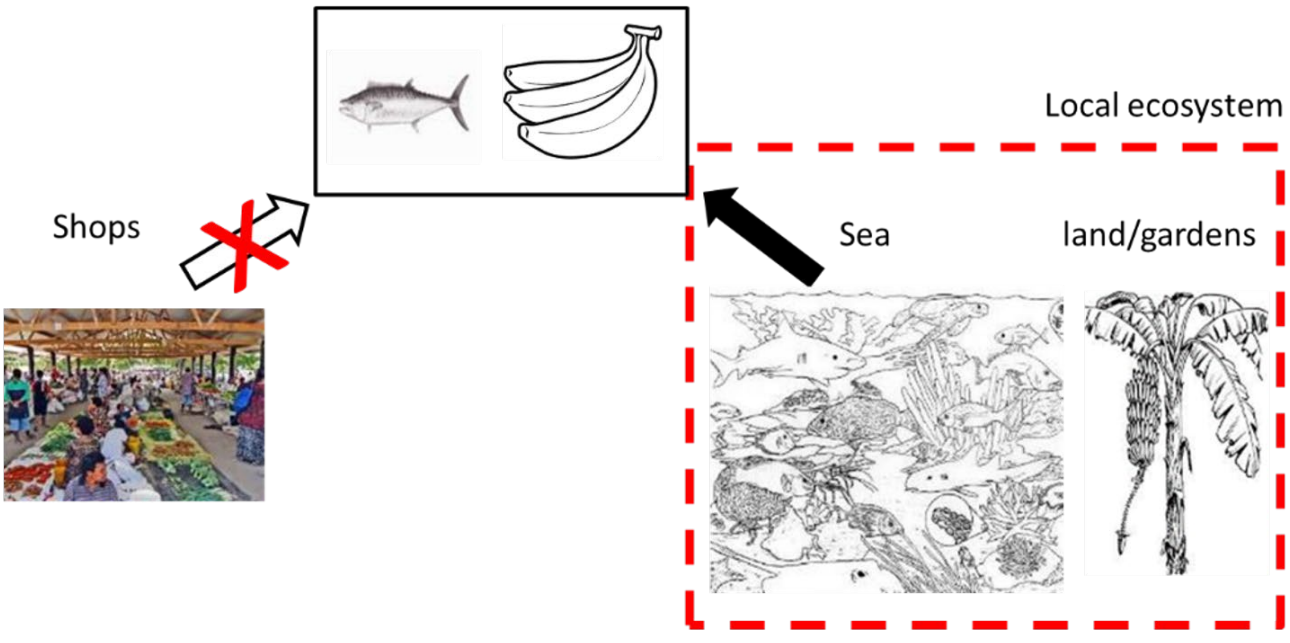


Figure 42 EGS from your land and sea, not what you buy at the shop

Estimate EGA volume

Next, focus on EGS volume. Using printed scoring sheets, ask the participants to:

1. Check the EGS list and add any missing EGS, with its supporting habitat. Ask them to focus on important and emerging EGS – but remember, you do not want too many EGS in the list as it becomes more time consuming to carry out the valuation process.
2. Decide which EGS on the list have the most VOLUME utilised by the focus community, and score them with a "5".
   - **Note**: Volume can be in any suitable measure – *e.g. tons, or baskets etc* – the final outputs are very robust to this kind of detail – the relativities are the most important.
3. Go back to the top of the EGS list and score the VOLUME of each EGS relative to the most utilised EGS from 0 (none) to 5 (same). Most will be less, but it is fine to have two or three EGS that are all scored 5.

This process has to be **closely facilitated**. You have to make sure that the score represents the VOLUME of the EGS only, and not include other factors like high income or cultural importance.

You have to **reassure respondents** that their favourite EGS will not be ignored.

Also, remember to:

- Score average VOLUME over the last three years, which accounts for variation.
- All cells in the VOLUME column require an entry, even if they are zeros.
- Use fractions if you want (i.e. 2.2, 1.6, 3.1 etc).

Consulting with the community

Estimate EGS value

Next, ask respondents to score the relative VALUE of each of the EGS:

1. Score the VALUE of each of the EGS as its relative VALUE to each of the four constituents of wellbeing: income, health, food security and culture.
2. Starting with income, ask them to look at the EGS list and decide which ones have the most relative VALUE for income, and score them as '5'.
3. Go back to the top of the list and score all the other EGS relative to the EGS with the greatest relative VALUE for income from 0 (none) to 5 (same). Most will be less, but it is fine to have two or three scored at 5.
   - **It's important that the relative value of each EGS is scored - that is, assuming you had the same quantity of all the EGS.** *e.g. 1 tonne, 1 basket, etc.*
   - **Score average VALUE over the last three years (to account for variation).**
   - **You can use fractions if you want**. *i.e. if you have split decisions within an elicitation group*

Repeat the estimate EGS value step for the other three constituents of well-being: health, food security and culture.

Enter and analyse the data

Once you have collected all the information, it can be entered into the ADWIM Excel spreadsheets during the workshop (or overnight) and be ready to use in later sessions.

Entering EGS data

Present results

Presenting the outputs back to stakeholders during the workshop is a good idea, enabling them to review and potentially modify the results based on group feedback.

	Habitat	Initial EGS	Volume (0 to 5)	Value (0 to 5)			
				Income	Health	Food security	Culture
1	Arable	Banana	4	3	1	4	4
2	Arable	Betel nut	1	5	4	3	3
3	Arable	Breadfruit	1	5	4	4	1
4	Arable	Cassava	0	1	0	4	1
5	Arable	Cattle	2	3	2	2	2
6	Arable	Chickens	3	2	1	3	2
7	Arable	Cocoa	2	1	2	3	3
8	Arable	Coconut	3	1	1	1	2
9	Arable	Coffee	2	4	4	4	3
10	Arable	Green vegetables	3	3	5	2	4
11	Arable	Pigs domestic	4	4	5	3	3
12	Arable	Yam	1	2	3	2	3
13	Estuarine	Crabs	1	3	2	1	4
14	Estuarine	Fish, estuarine	3	4	2	3	3
15	Estuarine	Prawns	3	3	3	0	1
16	Estuarine	Timber	1	4	2	0	3
17	Forest	Cuscus	5	4	4	0	4
18	Forest	Forest birds	5	4	5	3	2
19	Forest	Medicines	1	2	2	4	2

Figure 43 An EGS scoring sheet with the data entered

References and additional resources

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/watch?v=OxyxMDg50gQ

Resources

TOOL: If you would like to download the **ADWIM values elicitation tool** go to: https://doi.org/10.25919/fpgq-6p71

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Acknowledgements

This module was developed by:

Tim Skewes (Tim Skewes Consulting): an ecologist with a background in coastal fisheries and ecosystems, valuing ecosystem goods and services, and assessing the impacts of climate change.

Nicky Grigg (CSIRO): a research scientist who works in interdisciplinary teams on a diverse range of projects concerned with global change and social-ecological systems.

Value Chain Analysis

In this module, you will learn:

1. **What value chains are, and their importance for people's livelihoods?**
2. **Why undertake a value chain analysis?**
3. **How to map a value chain**
4. **How to analyse the way value chains are impacted by climate change and other drivers of change?**

Mapping a value chain. Image by Sara Busilacchi

What are value chains and why are they important for livelihoods?

Value chains are the range of activities required to bring a product from production or harvest to the final consumers (Kaplinsky and Morris, 2001) and how value is created across the system.

Some value chains are local—think of the cassava grown in the gardens and sold at the local market. Some others are global —as for the mud crabs, which are caught in the mangroves and often exported to international markets.

Usually, activities along the value chain aim to add value to the product as it moves along the chain from producers to consumers. They usually include production, processing, transportation, storage, and consumption.

These value-adding activities are conducted within diverse and complex social networks, which influence how the value chain functions.

The term value chain **'actors'** is often used. It refers to the people or groups of people such as fishers, farmers, middlemen, etc., who are directly involved in the value chain as producers, processors, traders, etc. These actors are linked among themselves through the flow of products, money and information, as you can see in the diagram below.

In addition there are organisations that are part of the enabling environment for value chains. They are involved in the management, monitoring and regulating of the value chains.

Value chains do not work in isolation but are part of larger complicated systems with context-specific socio-ecological, economic, political and cultural characteristics that influence how the value chains work (Bolwig et al., 2010).

As such, two very important factors that have to be considered with value chains are:

1. The **governance structure**, and
2. The **social networks** in which actors are involved, especially the power relationships and trust among actors.

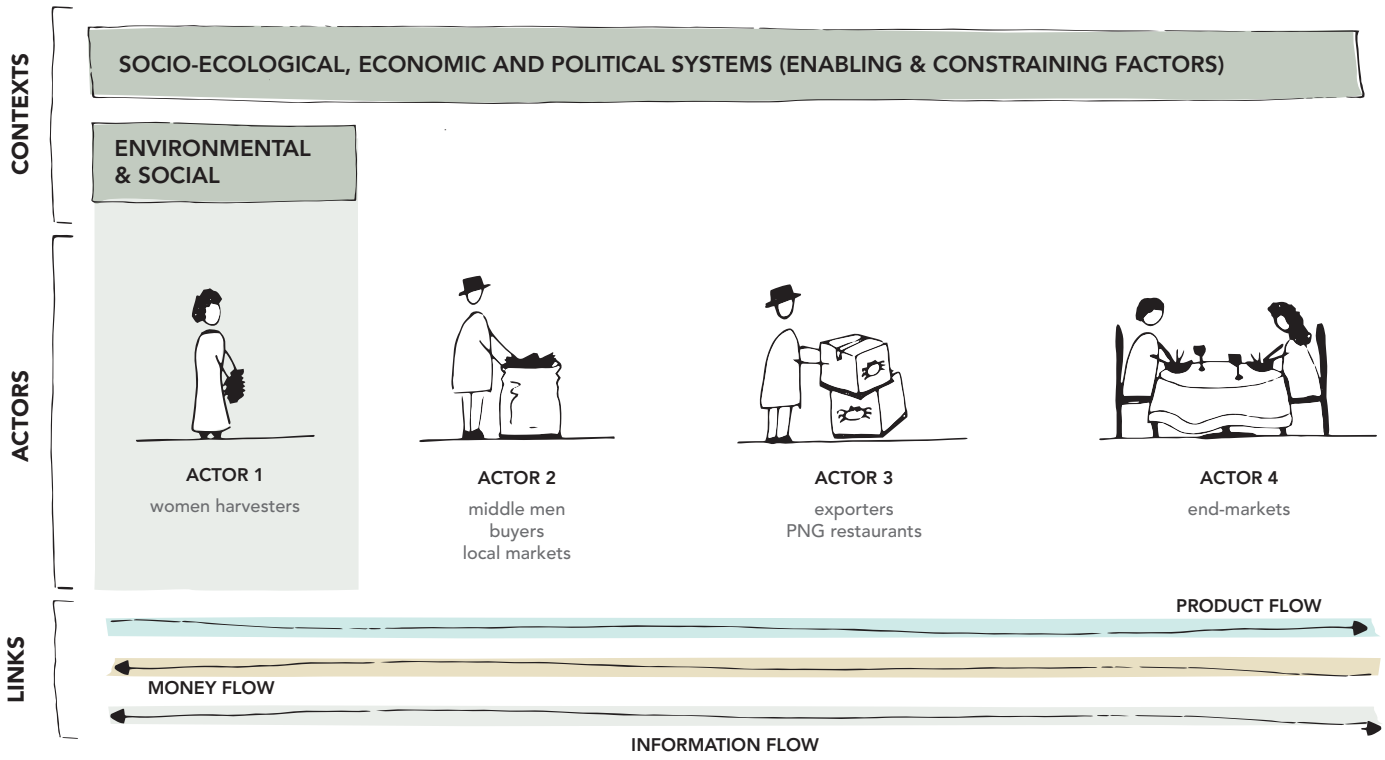


Figure 44 Mapping the value chain. Idea by the KBSP Team. Artwork by Dr Manuela Taboada, Queensland University of Technology

Climate pressures and their impacts on value chains

Value chains are usually resilient to climate change, especially in the short term.

However, extreme and more frequent climate events pose risks that can impact different parts of a value chain. The chart below shows some climate pressures and impacts that they may cause.

Climate pressures

- Changing temperatures
- Changing rainfall
- Extreme weather
- Flooding
- Drought
- Sea level rise

Climate impacts

- Impacts on water and soils
- Impacts on production
- Impacts on storage
- Impacts on movement of goods
- Impacts on infrastructure (roads, shipping, telecommunication, etc.)

Why undertake a Value Chain Analysis

Value chain analysis (VCA) allows for a better understanding of how value is created along the chain for all actors.

When you analyse a value chain, you want to understand how the value chain works and the barriers and constraints actors face, but also opportunities that could help them to improve the operational efficiency and the value chain's resilience.

Value chain analysis is also useful to identify and develop higher-value end markets which can enhance producers' and other actors' livelihoods. Lastly, value chain analysis can be used to understand actors' challenges resulting from drivers of change, including climate, and ways to enhance the value chain's resilience to future risks.

> "You want to also understand how socio-economic, political and cultural issues influence value chains."

You might be particularly interested in the following:

- Governance issues
- What is going on between actors
- What keeps actors together
- What power relations exist
- How relations evolve

The Governance Mapping Tool Module can assist you understand these aspects.

What is Governance Mapping (soccer video):
https://www.youtube.com/watch?v=tLDkOnT2aDk

Tool:
https://www.youtube.com/watch?v=Ui_9bZV9YwE

"You may also want to know what roles specific population groups play in the value chain, such as women, youth, people with disabilities and marginal/ poor households."

All this information is particularly important to know, especially when trying to implement value chain interventions to build their resilience to external drivers of change, as you have seen in the module on the Well-being Impact Model (also known as ADWIM), or to design specific interventions that can increase inclusion and equality for women, youth, people with disabilities and poorer households.

The knowledge co-produced during value chain analysis allows for a better understanding of the way that value is added to a product as it moves from producers to consumers and who adds that value. Through a collaborative and iterative process, a value chain analysis allows you to improve the sustainability of value chains and their resilience to external drivers of change by:

1. Identifying points along the chain where there are constraints, barriers, and opportunities that can be addressed.
2. Identifying the decision-making process when scoping for new markets and developing value-adding activities such as better processing of products.
3. Understanding the behavioural drivers, means understanding why people do things as they do.
4. Identifying higher value end markets and how to connect to them, would enhance the economic gain of actors, especially producers.
5. Understanding the impacts that drivers of change, including climate, can have on the activities and products along the value chains to future-proof the operations against associated risks.

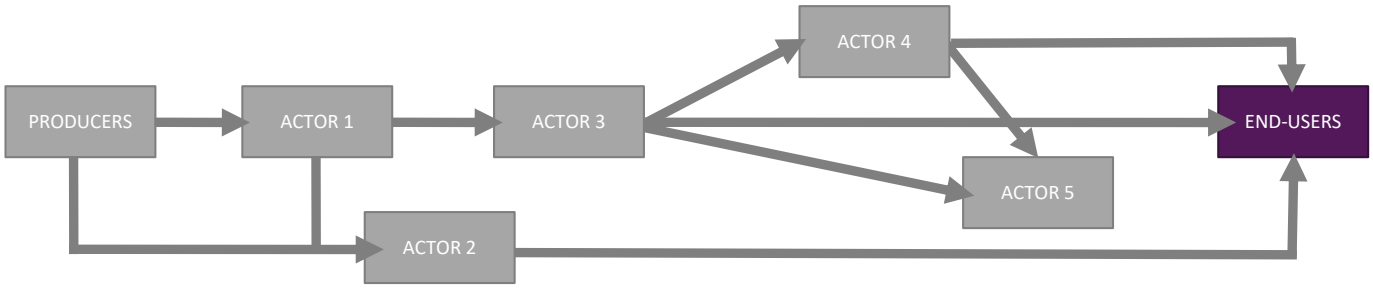


Figure 45 Generic Value Chain Mapping

Value Chain Mapping is the process that creates a visual diagram of the value chain using data and information about the horizontal and vertical dimensions of the value chain.

Value chain analysis is a process for understanding the components in a value chain and the system in which it operates to add value to the product (stepping up) and build the resilience and sustainability of the chain. It is also used for identifying new end-market opportunities (stepping out). As a Knowledge Broker, you should decide how to adapt the process to the context, project objectives and available resources. As new information is available, you should continuously revise the methodology and iteratively co-design market-based solutions.

Value chain mapping is an effective analysis process that creates a visual diagram of the value chain using data and information on the horizontal and vertical dimensions of the value chain.

Step 1: The Vertical Dimension

The vertical dimension of a value chain includes all the components of the value chain itself:

- actors involved
- value-adding activities
- the flow of money and information
- points of economic gain or loss

Step 2: The Horizontal Dimension

The horizontal dimension of a value chain includes all the system components in which the value chain operates (that is, the context in which the value chain operates). These include:

- governance structures
- dynamics amongst actors
- power relations
- roles of specific population groups

Data collected during value chain mapping also allows an understanding of **constraints, barriers, and opportunities to build the resilience and sustainability** of value chains. This information includes information on the impact of climate change and other drivers of change on value chains.

The data needed to map the value chain is usually collected using different methods (i.e. **mixed-method approaches**). Methods commonly used are: secondary data research, individual interviews, key informant interviews, focus groups, workshops and participatory chain mapping. These methods are used to collect different types of information and vary according to the context and different groups of people.

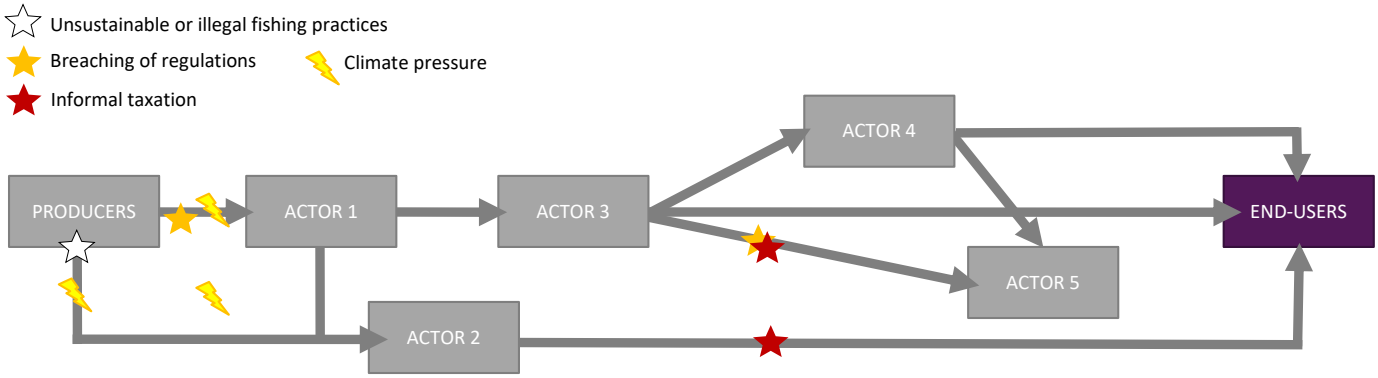


Figure 46 Generic Value Chain Mapping, including barriers and constraints

MIXED METHODS APPROACHES

For the majority of tools, data will need to be collected to inform the understanding of the system and to support the decision-making process. It is usually collected using different methods (i.e. mixed methods approaches). It includes collecting two types of data.

Quantitative data is information on quantities that can be measured and expressed in numbers and displayed through graphs, charts etc.

Qualitative data is information that cannot easily be measured, but that can tell a story. Quantitative and qualitative data can be directly collected. This is called primary data. This can be done through:

- individual interviews
- key informant interviews
- focus group discussions
- surveys

These methods are used to collect different types of information and vary according to the context and different groups of people.

You can also use data that has been previously collected and analysed by others. This is called secondary data. Secondary data is collected through literature reviews, reports, internet searches as well as government and business statistics.

Note: when collecting primary data think about who you are involving in doing interviews as well as participating in the interviews. Stop and think *"Are the people participating representative of the people in my system?"*. If you do not do this, you will get information that is not complete.

When using secondary data ensure the source is reputable and not biased. It is always good to cross check if you are unsure and look for additional sources of information.

Remember, you need to triangulate and verify the information you collect with different actors and any secondary data you have.

End market analysis:

- allows producers to explore higher-value end markets and make informed decisions on how to access those end markets that offer the greatest benefits.
- requires expert knowledge, and if you want to add it to your analysis, you should recognise when to seek additional support. If the expertise is not available within your organisation you should seek it externally.

How to map a value chain

If you are interested in undertaking a value chain analysis for your project, below is a brief description of 'How To' with the steps you should follow.

Remember that this is a general guideline, and you should adapt the tool to your project, needs, resources and team capabilities.

There are four key steps in mapping a value chain to generate interventions. Value chain maps are created during the first three steps. The fourth step identifies the root causes of barriers and constraints, and interventions are agreed upon.

- **STEP 1: The vertical dimension**
- **STEP 2: The horizontal dimension**
- **STEP 3: Using the template to visualise map**
- **STEP 4: Identifying root causes and finding solutions**

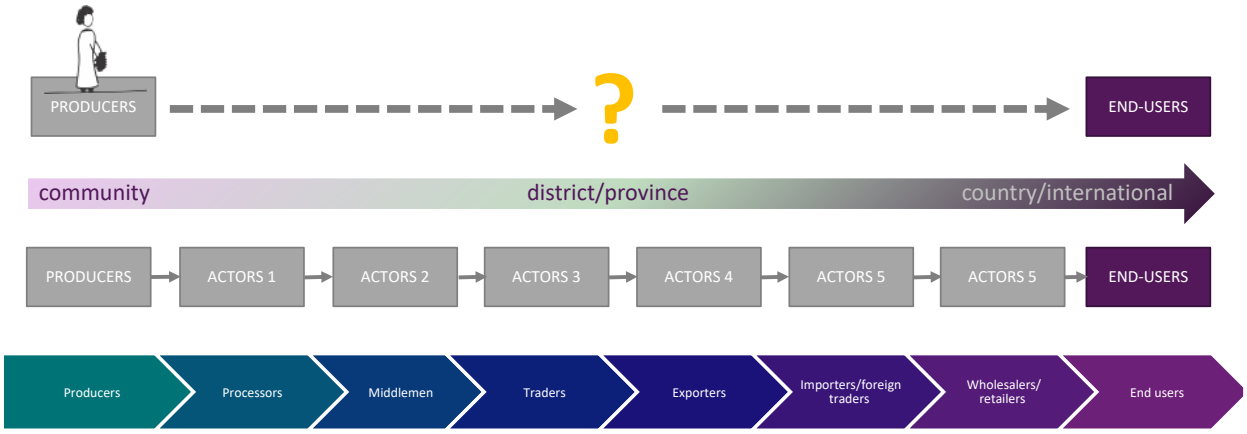


Figure 47 Gather data on the components

STEP 1: The vertical dimension

The first step is to gather data on the components of the vertical dimension.

This includes:

1. Identifying the groups of actors involved in the value chain. Depending on the complexity of the value chain and whether the products are traded locally or domestically, or they are also exported overseas, actors can include producers, processors, middlemen, traders, exporters and importers, wholesalers and end-consumers. You should be able to identify each of these groups when undertaking interviews or surveys.
2. Understanding the value-adding activities conducted by each group of actors (e.g. fish processing adds value to fish).
3. Understanding the costs and expenses incurred by each group of actors.
4. Identifying actors' perceptions of climate change impacts on all the value chain activities.

METHODS USED

Individual interviews are usually used to collect these data from each group of actors along the value chain. Quantitative data is mainly collected. Usually, the first actors to be interviewed are the producers, who can be identified by the community leaders or by talking to other actors to be interviewed. From there, the other actors to interview are identified through snowball sampling in which people interviewed provide referrals to recruit other actors to interview.

Note: In some cases you can also start with other actors and work backwards and forwards to interview all value chain actors.

Remember, you need to triangulate / verify the information you collect with different actors as well as with any secondary data you have.

Tip: When talking to actors ask them questions about changes they have noticed in the way they are conducting the activities which can be related to changes due to climate impacts such as more frequent flooding, sea-level-rise etc. This is used later in discussion in workshops about climate impacts.

STEP 2: The horizontal dimension, including the impacts of climate change

The second step is to gather data on the components of the horizontal dimension. This means that you should collect data that allows you to understand:

- the power relations among actors and between actors and other stakeholders;
- the governance structure and decision-making processes in which the value chain operates (see the module on Governance Mapping for how to undertake governance mapping);
- the socio-economic context in which actors live, especially for producers who are often the focus of our interventions;
- the barriers and constraints faced by actors (e.g. regulations); and
- opportunities actors may have (e.g. new markets, new production techniques, etc.).

Apart from identifying stakeholder perceptions on climate change impacts on all the value chain activities, this step is important to understand the adaptive capacity of the actors, especially the ones that are a focus of your projects.

When mapping the horizontal dimension, you want to understand how the existing socio-economic and political system prevents the actors from adapting to the changing conditions. You also want to identify opportunities to build on existing relations and activities.

Focus groups

Collecting data

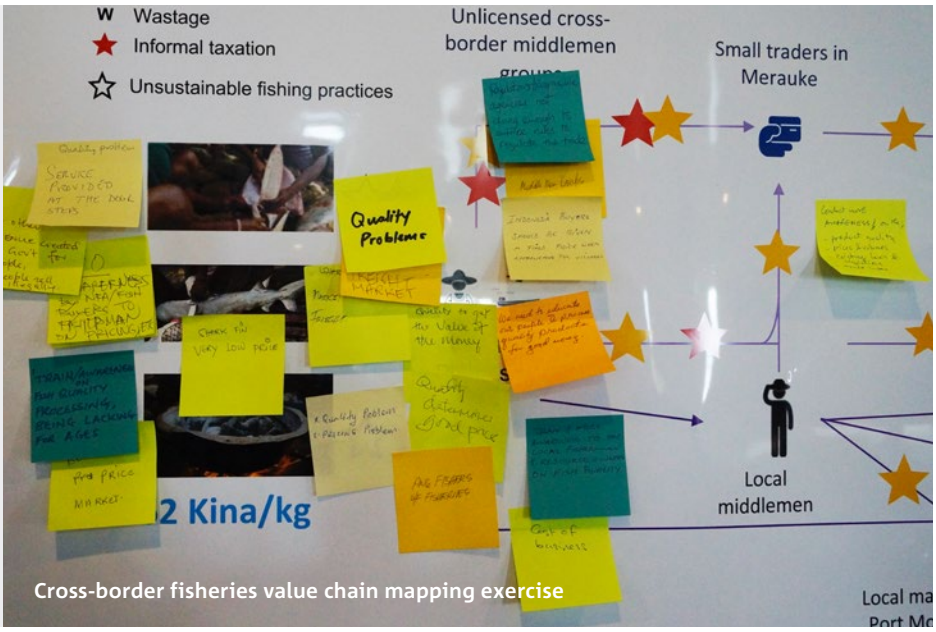
METHODS USED

Key informant interviews are usually used to collect these data from stakeholders who have knowledge of the value chain but are not directly involved, such as local or government officers who are in charge of regulating the operations connected with the production and trade of the products. These stakeholders are well-informed on the issues and structure of the value chains, even if they are not directly involved in the value chain activities. A question guide can be used in which a list of open-ended questions is prepared to help direct the discussion with the key informants.

Focus groups are usually conducted to have a more in-depth understanding of the value chains and with specific community groups such as women, youth, fishers, etc. This method is generally used to follow up on and validate information collected with the other methods, such as possible issues and strengths in existing value chains, new market possibilities and ideas and potential incentives for change.

EXAMPLE: CROSS-BORDER FISHERIES VALUE CHAIN IN PNG AND INDONESIA

The image below is an example of a cross-border fisheries value chain mapping exercise between PNG and Indonesia. It shows the complexity of the value chain system with the variety of actors from local to international, as well as the challenges. Based on this map, stakeholders have been able to identify a number of solutions to increase the resilience of the value chain.



Cross-border fisheries value chain mapping exercise

STEP 3: Using the template to visualise map

Using the data collected in the previous two steps prepares the value chain map. Below is an example from Papua New Guinean of a local fisheries value chain where product was traded into Indonesia and then international markets mapped by CSIRO.

In the example shown in Fig 48, the value chain map identified the actors along the value chain, the value-adding activities taking place along the chain, and the flow of money along with the legislative framework around the value chain.

Characteristics of the socio-ecological, economic and political systems were also identified. The map, which is a visual representation of the value chain, is usually accompanied by statistical analysis of the quantitative data, such as prices and quantities, and a narrative inferred from the qualitative data collected.

Download the template below to create your own value chain map. https://learnwithacfid.com/pluginfile.php/7556/mod_scorm/content/14/scormcontent/assets/ukcBzsNuHs7toCBg_cI4SrH5jTn7UUCtp-ValueChainAnalysisTemplate.pptx

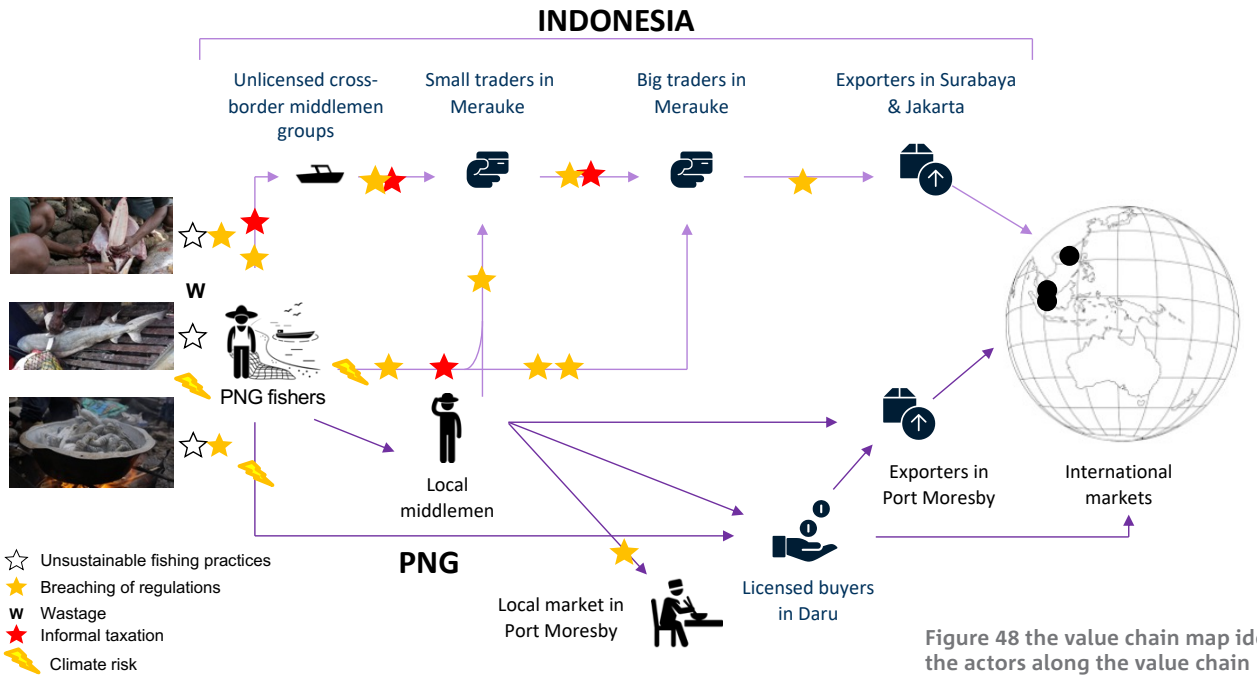


Figure 48 the value chain map identified the actors along the value chain

STEP 4: Identifying root causes and finding solutions

This step seeks to understand the root causes of barriers and constraints, including those that weaken the adaptive capacity of target actors, and agree on solutions to build the resilience and sustainability of value chains.

This step is usually conducted during a participatory multi-stakeholder workshop, which brings together representatives of the various value chain actors, groups and other relevant stakeholders. Experts with specialised knowledge on climate change and other drivers of change can be invited to present scientific data about these drivers.

If you would like to watch a video on how to do Value chain analysis please go to https://www.youtube.com/playlist?list=PLa3eWR75XNLy4JnkcKHJKnsuAcnNe1-SQ

METHODS USED

Participatory multi-stakeholder workshop including representatives from various groups, experts, leadership representatives and other relevant stakeholders.

During the workshop, a Causal Loop Analysis (see causal loop module). To learn how to undertake this, visit the module on Casual Loop Analysis: https://learnwithacfid.com/mod/page/view.php?id=645

Case study 1: Mangoro Market Meri

The Mangoro Market Meri project is being implemented by The Nature Conservancy (TNC). Women are developing mechanisms to effectively and sustainably manage their mangroves and nearshore fisheries, aiming to reduce or eliminate over-fishing and over-harvesting.

As part of the project, TNC and CSIRO mapped the mud crab value chain with the value chain actors.

Watch Mangoro Market Meri case study video here: https://youtu.be/KxN5zxGqoow

You can learn more about Mangoro Market Meri via https://www.nature.org/en-us/about-us/where-we-work/asia-pacific/asia-and-the-pacific-women-in-conservation/women-guardians-of-the-mangroves/

Photo by Ruth Konia, TNC

Case study 2: OK Tedi Development Foundation

Women in the Fly River, Papua New Guinea, with the support of the Ok Tedi Development Foundation (OTDF), want to explore new or improved markets for fisheries products important for their livelihoods.

OTDF has been working with CSIRO to map tilapia and mud crabs value chains in the Fly River to identify interventions to improve livelihoods.

Watch Ok Tedi Development Foundation case study video here: https://youtu.be/D83BeyOuFW4

Read more about the OTDF exploration via the project overview by the Australia Centre for International Agricultural Research here: https://www.aciar.gov.au/project/fis-2020-110

Photo by Josephine Laka

Skills and competencies needed for undertaking a Value Chain Analysis

As a Knowledge Broker undertaking a value chain analysis, you will deal with the complicated decisions faced across the value chain, which require all of the competencies.

In this role, you and your team should bring together diverse knowledges from value chain actors and decision-makers with different expertise and backgrounds to co-produce new knowledge to integrate into decision-making. This co-produced knowledge is context-specific as it is produced through an iterative and collaborative process that engages actors who have knowledge of the system. The iterative, collaborative and contextualised nature of the process helps to increase the resilience and sustainability of the value chain.

You and your team will also need to be open to the multiple stakeholders across the chain and deal with ambiguity, especially with data uncertainty and the absence of knowledge and data. This will help you to better understand the various challenges and risks.

As already discussed, value chains are by their very nature complicated systems, so you will need systems thinking capabilities.

You and your team will need to apply strategic and future thinking to help value chain actors plan and ensure they have a clear understanding of the goals, who is doing what and when they are doing it, while imagining a more sustainable and resilient future.

References and additional resources

If you would like to watch a YouTube video on this module, please see https://www.youtube.com/playlist?list=PLa3eWR75XNLy4JnkcKHJKnsuAcnNe1-SQ

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Acknowledgements

This module was developed by:

Sara Busilacchi (Independent research scientist): a research scientist with a background in fisheries science with a focus on social-ecological systems thinking for the sustainability of small-scale fisheries in a changing world using collaborative and participatory approaches.

Michaela Cosijn (CSIRO): an innovation broker who works in international development programmes solving complex problems and enhancing livelihoods, with her work focused on agri-food innovation systems, gender integration, and climate adaptation.

James Butler (CSIRO): a sustainability scientist with a background in agricultural economics, terrestrial, freshwater and marine ecology gained in southern Africa, Europe and Australia.

Governance mapping

In this module, you will learn:

1. **What governance is and what good governance looks like.**
2. **Why use governance mapping to support complex decision-making.**
3. **How to undertake governance mapping.**

What is governance?

Governance is the process of decision-making involved in the management of the environment, its assets and resources for the benefit of people, while minimising the risk of negative consequences to the community or environment.

Here is a formal definition of governance in the context of the use of natural resources:

> **"The norms, institutions and processes that determine how power and responsibilities over natural resources are exercised, how decisions are taken, and how citizens participate in and benefit from [their] management"** — Campese et al. 2016, p. 1

In the context of natural resource use, governance aims to increase the benefits of the resource to the people who use them and avoid over-use (over-extraction), ensuring sufficient resources now and into the future. This also applies to value chains and markets, which also need to consider the governance of natural resources.

Natural resources and governance

Examples of natural resources include mud crabs, cassava, mangroves, fish, forests and crops. Some of these resources are a public good – which means they are available to everyone for consumption, but access to them can still be managed via licenses or even via traditional laws that can allow or forbid (tabu) access to the resource.

Who is involved in governance?

A governance system establishes 'who' makes decisions, 'what' their powers and responsibilities are, and 'how' they exercise them.

It consists of two interacting systems:

- People and organisations, called actors
- Rules or institutions (formal and informal)

Government, people, and organisations operate at multiple scales from local to national governments, traditional hierarchies, from villages, to regions, and international agreements.

People and organisations (i.e. groups, industry, government, departments, etc.)

Governance includes not only government and the rules that it sets, but any people or organisations that interact, regulate or organise anything to do with that resource (e.g. processing and selling it).

Rules and institutions (formal and informal)

- Laws and regulations set by governments
- Social norms and cultural conventions (traditional laws) – Traditional governance systems are also important to manage natural resources and are often formally acknowledged by governments across the Pacific. Governance involves regulation incentives and traditions – norms around ways of doing things.

Formal and informal rules, also called institutions, mediate how people interact among themselves and with natural resources.

Formal and informal rules are important. Shared expectations often modify or overrule written rules and vice-versa. Aspects like conflicts of interest and the distribution of power are important to understand.

AN EXAMPLE OF GOVERNANCE FOR BÊCHE-DE-MER (SEA CUCUMBER)

The government can establish a formal rule (a law or regulation) establishing that bêche-de-mer can no longer be fished for a certain period of time, at particular places (or both), to try to increase its numbers if overfished. Rules are formalised in fisheries management plans. A community, via traditional law (informal rule), can also establish minimum sizes, spatial or temporal bans on certain species. Informal rules are not written. Formal and informal rules should be observed but are sometimes broken. If they are broken, there may be punitive measures meant to incentivise people not to break the rules.

A SOCCER ANALOGY FOR GOVERNANCE

Governance describes 'who' makes decisions, has powers and responsibilities, and 'how' they exercise this.

It consists of two interacting systems:

- Rules (institutions)
- People (organisations)

Soccer can be used as an analogy for the governance of natural resources.

'Who' are obviously the players, but soccer clubs, regional soccer bodies, and even the supporters are also part of the 'who'.

'How' includes how the players interact, but also how the championships are organised, the prizes, and processes to resolve conflicts, for example, a decision made by a referee.

Like in any governance system, soccer consists of two interacting systems: the institutions, or rules of the game, and organisations, or the people involved.

Playing soccer involves only a few rules:

- Two teams
- A soccer field
- A certain number of players in each team
- A goal
- As long as the ball stays in the field, the game is in play
- And most importantly, NO HANDS!

An example is Pele, was a very skilled player, who did a few tricks that only he could have done to score this goal during the 1958 World Cup.

A less experienced player would do it very differently and probably wouldn't have scored the goal!

Some people don't follow the rules and if they are not caught, they can even win a World Cup! Remember a basic rule of soccer is: NO HANDS!

The governance of anything, including soccer, involves rules and people, where people create the rules that mediate the interaction between people and between people and resources.

AN EXAMPLE OF FISHERIES GOVERNANCE

The governance of fisheries can be very complex as several formal and informal rules are often applied in the same area. The regulations set by national governments and informal rules to manage fisheries often interact with each other.

For example, in Fiji, the national government recognises traditional fishing grounds called qoliqoli and there are certain formal and informal rules that are used to manage these fishing grounds. For instance, the government sells fishing licenses to commercial fishers but a condition of the license is that they are required to seek permission from owners to fish on their fishing grounds.

Formal and informal rules are applied in the same area and it is important to understand each one and how they interact, as misunderstandings can lead to conflicts and unsustainable practices, while harmonisation of the two rules can lead to more sustainable practices and outcomes.

Rules and regulations external to the management of the fisheries may be relevant as well. For instance, forestry and water management may affect water quality on the fishing ground, impacting fishing.

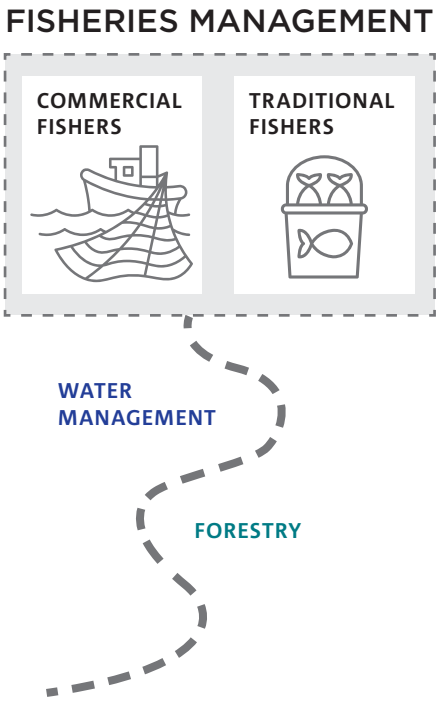

Figure 49 Management of fisheries

What does good governance look like?

Good governance is an important concept and consists of six different elements that are all equally important.

Figure 50 Attributes of good governance Adapted from source: https://learningforsustainability.net/good-governance/

Why map governance?

Governance mapping helps you to understand: Who is involved, how decisions are made, what and when these decisions are made and what outcomes are expected from these decisions.

When you map a governance system, you bring information on actors, decisions and outcomes together by asking the simple questions of who, how, what and when.

When you map a governance system, you also better understand the local strengths and weaknesses in the governance system. You also better understand the needs of decision-makers and how to improve it.

Context-specific and structured approaches to mapping governance can be useful in:

Governance mapping is the process of understanding both the people and rules of the game and how these two interact with and impact resources.

- Obtaining a clear view of the overall system (i.e. a snapshot).
- Identifying actors and the relationships between them.
- Helping all involved in the process better understand the decision-making processes and how the different elements fit together.

It will enable you to answer many different questions, such as:

- Who? Who makes the important decisions?
- How? How many different leaders, organisations, committees and agencies are involved in the decision?
- What? How do they influence the outcomes of decisions, and what rules and processes are required to better deal with the problems we are dealing with?

The Governance Mapping Process

Before you start to do the mapping, think about the following:

Why

Understanding 'why' you are mapping governance is probably the most important step in the process as it will help you to focus your engagement approaches and analyses (i.e. define the reason and the areas of interest). If you don't, your governance map can become very wide and it can be hard to define an entry point.

Examples of why you may want to map governance

- solve issues within the value chain
- understand who makes decisions in relation to water use
- better manage legal and illegal fishing in your area
- improve the use of resources such as forestry

Who

When the reason for doing the governance mapping is clear to you, the next stage is to identify who will be involved. Remember that you are trying to understand a 'game', so you need someone who is a player or who really understands the game, otherwise, you won't get the answers you need to properly map the governance system.

Example of who you may involve if you are mapping governance to solve problems related to illegal fishing:

- Fishers, both commercial and traditional
- enforcement officers
- local leaders
- government

How

Then you need to design a process so the people you identified can provide the information required to map the governance system.

There are several ways you can do the governance map.

- You can do secondary research and use documents to answer the questions.
- You can also organise interviews with key informants or get the information needed from focus groups and workshops.

You need to understand if people are willing and available to contribute, how much time they are willing to give and what they will get out of the process.

> The process must be useful to everyone and conducted in a sensitive manner.

When doing governance mapping with people, it is also important to consider personal circumstances because participants may have personal or work commitments, there may be planned community activities, etc.

Some people might not want to talk about governance because of their positions within the community or simply because they are uncomfortable talking, which you need to respect.

It is always good practice to provide the information from the project back to participants (following ethical guidelines) and see how the information can support existing decision-making processes.

Process Mapping

Define the issue

First, you should state your objective in doing the governance mapping; that is, why do you want to map governance around the natural resources of your interest? What is the problem you are trying to solve? This phase is very important as it will set the boundary of your research. You want to be sure to focus on the issue you are interested in and give the proper scale of detail.

For example, the problem you are trying to solve could be overfishing of traditional fishing grounds by outsiders (an access issue), or the clearing of mangrove areas because of lack of local authority, catch of undersized crabs because of lack of compliance, and so on.

At this stage, you also need to clearly define the area of interest. For example, a village, a group of villages, Province, etc.

Then you need to give a decision context so people can relate to it. For example, if you are trying to understand overfishing issues, you might want to know about the fishing activity:

- What sorts of decisions are made about fishing? Who can go fishing, what are they allowed to fish, where they can fish, how can they fish, etc.
- Why do people need to decide what to fish? Maybe because of the season to avoid over-exploitation.
- Who makes decisions? Fishers make decisions about fishing, but who else makes the rules, and enforces the decisions?
- How are the decisions made? Are there formal processes to allow fishers to catch? What information is used to decide what can and cannot be fished?
- How and when are decisions implemented? For example, closures, re-openings, minimum sizes, access?

The last two questions are about understanding bottlenecks and opportunities and asking them requires skilled facilitators because decision-makers will likely be in the room, and criticising them in public can lead to conflicts.

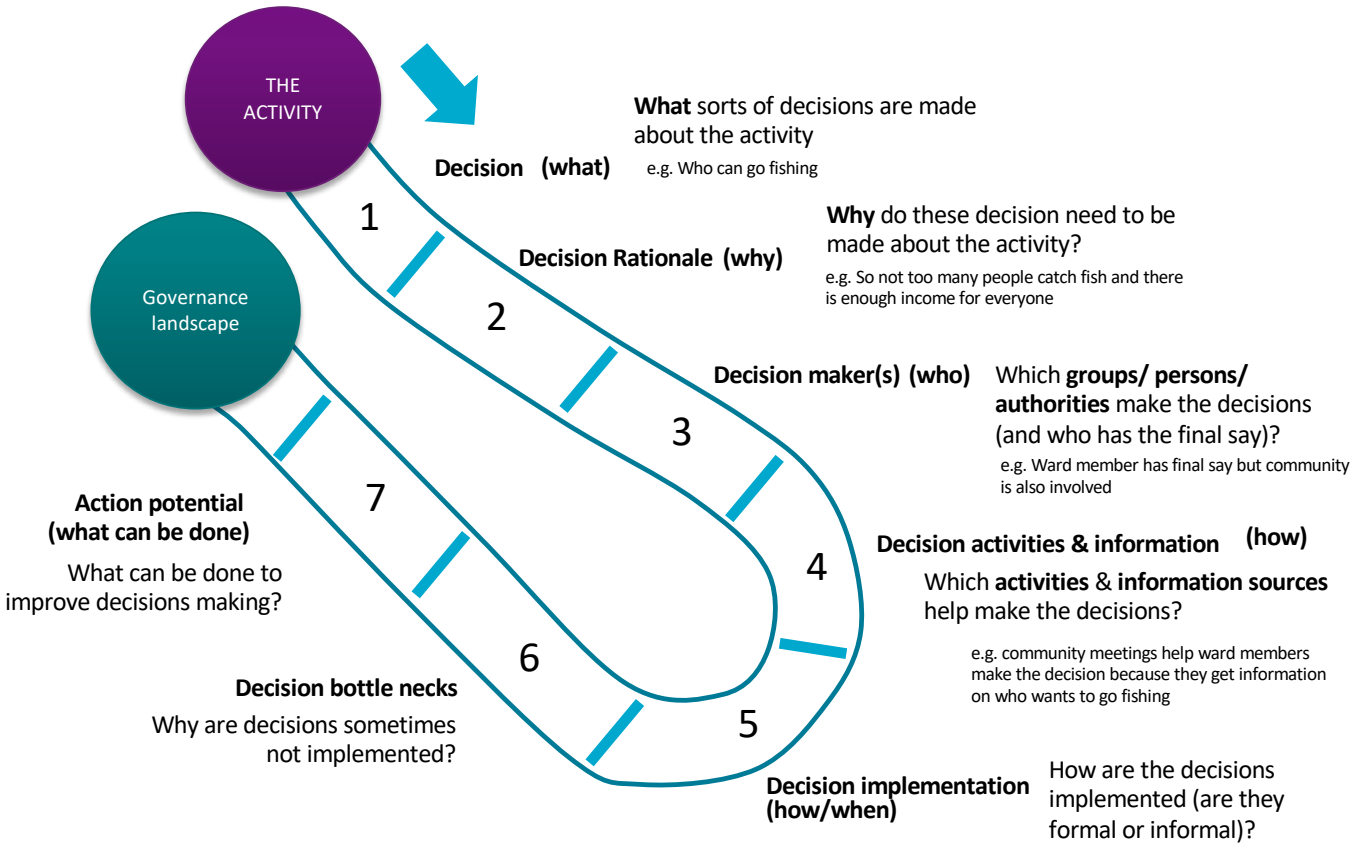

Figure 51 Process mapping. Artwork by Manuela Taboada, Queensland University of Technology

MAPPING GOVERNANCE - A FISHING EXAMPLE

Using butchers paper and coloured papers or post-it notes can help facilitators go through this process where each step will have a different colour and you can gradually build complexity as you go.

- **STEP 1:** Identify what decisions are made
  - In the first step, you add the sorts of decisions that are made. Fishing in the mangrove area is used as an example throughout this explanation.
- **STEP 2:** Identify why these decisions need to be made
- **STEP 3:** Identify who makes the decisions e.g. chiefs, government
- **STEP 4:** Identify which activities & information sources help decision-making, e.g. research, official reports, local knowledge.
- **STEP 5:** Identify how are decisions implemented (formal vs informal). E.g. the village by-laws, parliamentary processes
- **STEP 6:** Identify why decisions are not implemented (e.g. fishing by outsiders, lack of communication between government and chiefs)
- **STEP 7:** Identify what can be done to improve the governance process for each of the barriers (e.g. improving monitoring, and establishing formal and informal communication mechanisms).

Watch the video to see how this process has been applied by the Tawake community in Vanua Levu, Fiji.

References and additional resources

If you would like to watch a YouTube video on this module, please see:

TOOL: https://www.youtube.com/watch?v=Ui_9bZV9YwE

What is Governance Mapping (soccer video) – https://www.youtube.com/watch?v=tLDk0nT2aDk

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Acknowledgements

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Leo Dutra (CSIRO): is a senior research scientist and has multi-disciplinary expertise linking ecological processes, stakeholder engagement, governance and decision-making to support resource management, conservation and adaptation.

Ingrid van Putten (CSIRO): is a senior research scientist. Her research focus is to understand social and economic behaviour of marine resource users and their interactions with the biophysical marine environment, and to find ways to influence behaviour and reduce risks.

Sara Busilacchi (Independent research scientist): is a research scientist with a background in fisheries science with a focus on social-ecological systems thinking for the sustainability of small-scale fisheries in a changing world using collaborative and participatory approaches.

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Causal Loop Analysis

This module will explore the following:

1. **What causal loop analysis is and its strength in helping to understand the dynamics of complicated and complex systems**
2. **Why use causal loop analysis to understand systems dynamics**
3. **How to use causal loop analysis to assess the impacts of drivers of change, including climate on systems**

What is causal loop analysis?

Causal loop analysis is a strong tool to help understand the dynamics of complicated and complex systems.

Causal loop analysis allows you to assess qualitatively any complicated or complex systems within defined boundaries. The key strength of this tool is that it brings together stakeholders with different values, worldviews, and priorities and takes a systems view of the problems that they are aiming to address (Butler, J.R.A., 2017; Department of Home Affairs, 2019).

> A system is defined as 'a set of interdependent parts, connected through causal relationships, which together express a structured function or purpose'.
>
> – (Groundstroem, F., & Juhola, S., 2021)

As you have seen in the Systems Thinking Module, the complexity of problems faced depends on:

Content Complexity

- The decisions to be made are complex. The problems are 'multidimensional'. They are interrelated and have feedback mechanisms, in which an event or issue is related to another in a way that the more the first changes the more the other one becomes acute or improves. Vermaak, H. (2016)
- It allows you to better identify and address problems affecting your system of interest

Process Complexity

- Many stakeholders are involved in the problem, and they have different viewpoints, values and objectives. Stakeholders often struggle to collaborate to co-create solutions. Vermaak, H. (2016)
- It allows stakeholders involved in the process to increase their understanding of the system, its components and feedback thus increasing their systems thinking competencies.

Photo by Tom Greenwood

MANGROVE EXAMPLE

An example where content and process complexity play out is mangrove clearance. This provides income for harvesters and building material for homes but destroys nursery for marine species reducing income for fishermen and results in coastal erosion potentially damaging / destroying infrastructure (content complexity). Without alternative building materials or incomes for people harvesting mangroves, stakeholder will struggle to develop solutions (process complexity).

To really understand the system of interest (e.g. a particular value chain or a fisheries system), you have to understand it as a whole, and then examine the connections between the different parts and how these perform, and the complexity of the networks connecting them.

Example: In systems such as value chains, which include very diverse actors and which can be geographically and temporally distant, climate change impacts can couple with several other drivers of change in the system and have cascading effects throughout the network. Think of the recent COVID-19 pandemic and how several of our much-loved items on the supermarket shelves are now missing since the producers in far countries have not been able to go fishing, or work in the farm, while the truck driver could not deliver the product to the ship, and so on.

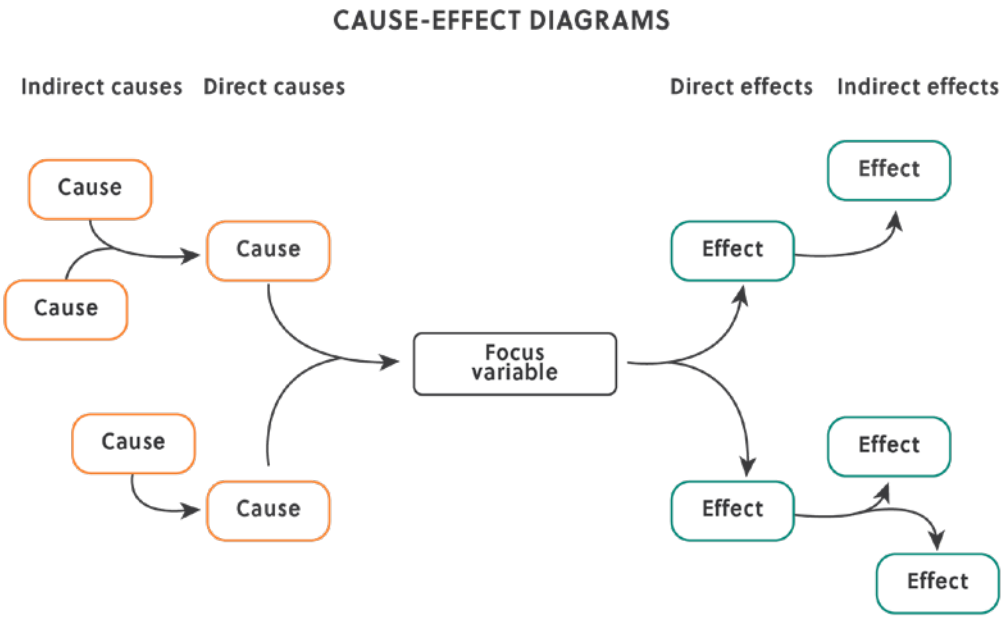

Figure 52 Causal loop – cause-effect diagrams. Source: Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making. 3 Guidance on Vulnerability CC-BY-4.0

Why use casual loop analysis to study systems' dynamics?

As outlined in the module on Systems Thinking, the world is changing faster than ever before and uncertainties about the systems we live in are growing. Causal loop analysis is a strong participatory yet easy to use tool which is used to:

- take a systems approach to describe and assess the complex systems you live and work in
- identify key interventions points
- build the capacity of participants in system thinking

Causal loop analysis can support decision-making in your projects at both content and process levels.

Causal loop analysis is a very effective tool that allows you to:

- consider the complexity of the examined system
- study it systematically and interactively
- find feedback mechanisms and explain why some issues tend to persist despite efforts to address them
- identify points in the systems where a solution can be applied with a higher likelihood of success

How to undertake causal loop analysis

In a causal loop analysis, participants break down a problem from a systems perspective. This powerful tool has four key steps, including identifying (i) an issue, (ii) the direct and indirect impacts, (iii) the root causes (direct and indirect) of the issue, (iv) feedback loops (positive and negative), and (v) key intervention points needed to change the system (Butler, J.R.A. 2017)

Step 1: Identify the key issues and their impacts

Before starting the causal loop analysis, participants at the workshop identify key issues that are barriers to the sustainable functioning of the system and decrease its resilience to drivers of change.

Usually participants are then divided in groups. Each group is given an issue.

Each group then considers the direct and indirect impacts of the issue and their linkages.

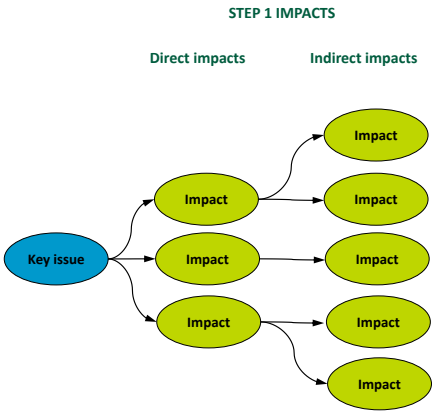

Figure 53 Template for considering the direct and indirect impacts of an issue and their linkages

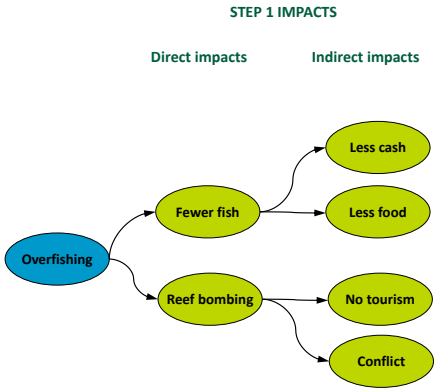

Figure 54 An example of overfishing as an issue in a system of small-scale fisheries

Step 2: Identify their causes

In the second step, each group investigates the direct and indirect causes, and their linkages. The causes of a key issue are also called controlling variables. The controlling variables influence the system. By identifying and targeting the controlling variables you can create change in the system.

You may not always be able to change the controlling variables, but you can look for opportunities to intervene that reduce the effect of controlling variables.

Without understanding the issues and their root causes – both their direct and indirect causes – you can often design activities that don't address the issue.

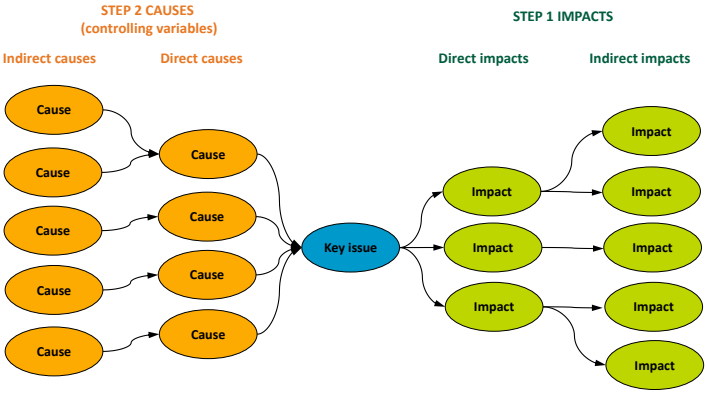

Figure 55 Template for considering the direct and indirect issues and causes of an issue and their linkages

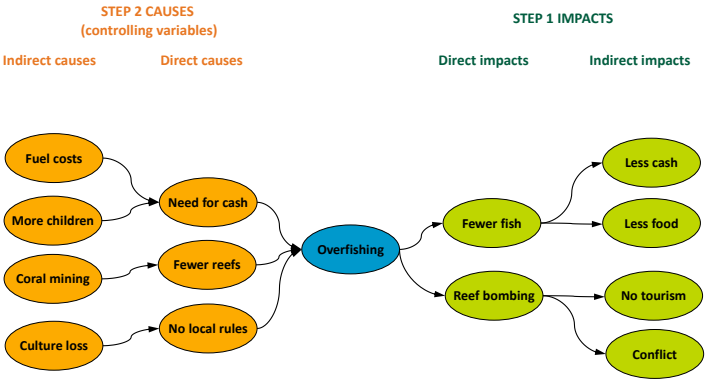

Figure 56 An example of overfishing as an issue in a system of small-scale fisheries

Step 3: Identify feedback loops

In the third step, each group considers feedback loops between impacts and causes. A feedback loop is a chain of cause and effect forming a loop that can either amplify or dampen the effects of change. For example, poverty can be reinforced by feedback loops – poverty leads to poor health, which leads to unemployment, which leads to greater poverty.

- Positive feedback loops amplify the cause or impact
- Negative feedback loops dampen the cause or impact

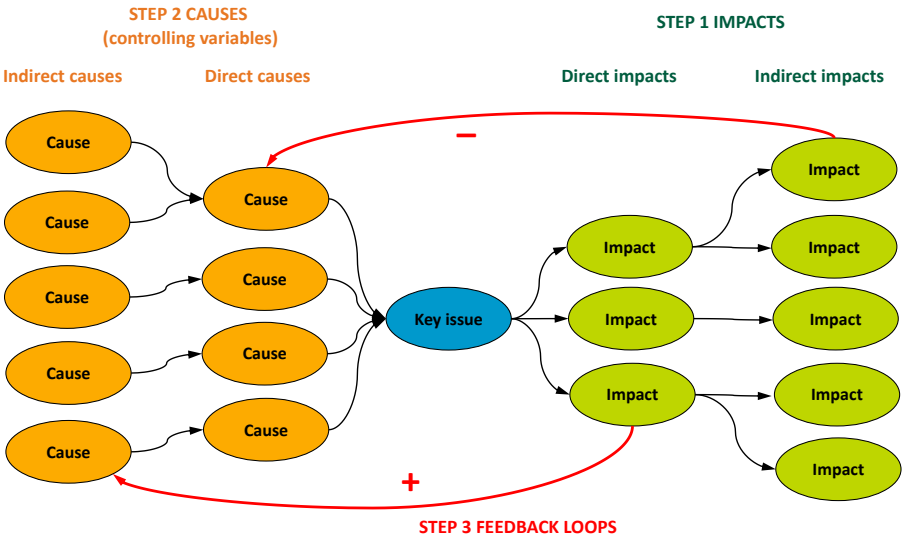

Figure 57 Template for considering the positive and negative feedback loops

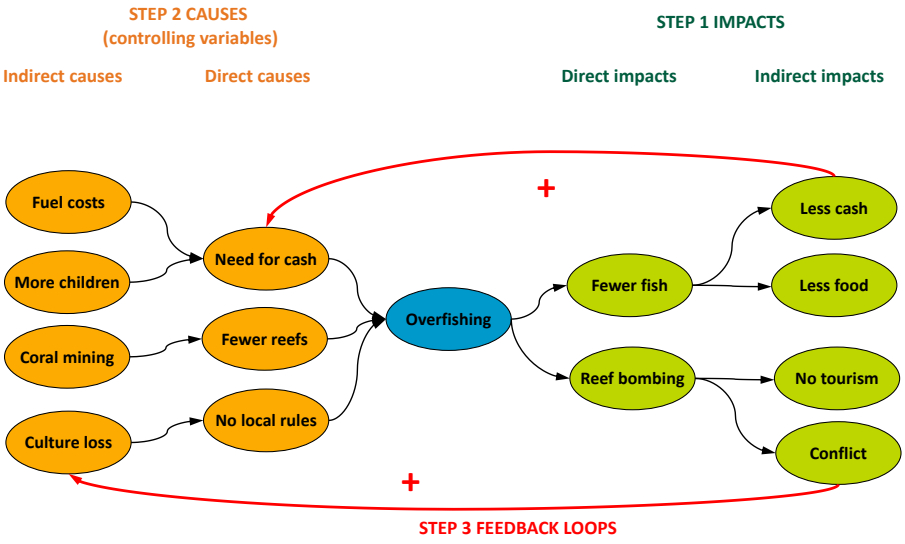

Figure 58 An example of overfishing as an issue in a system of small-scale fisheries

Step 4: Identify interventions

In the fourth step, each group designs interventions to intervene in the 'positive and negative cycles' created by the feedback loops. An intervention is any action that is planned or that is made in a system.

Interventions can be made that target the direct causes. However, to really address the key issues, we often need to find interventions that target the indirect causes. This often requires work with and partnering with a diversity of organisations.

In the fisheries example interventions include:

- Introducing local management of fisheries,
- Restoring culture, and
- Family planning.

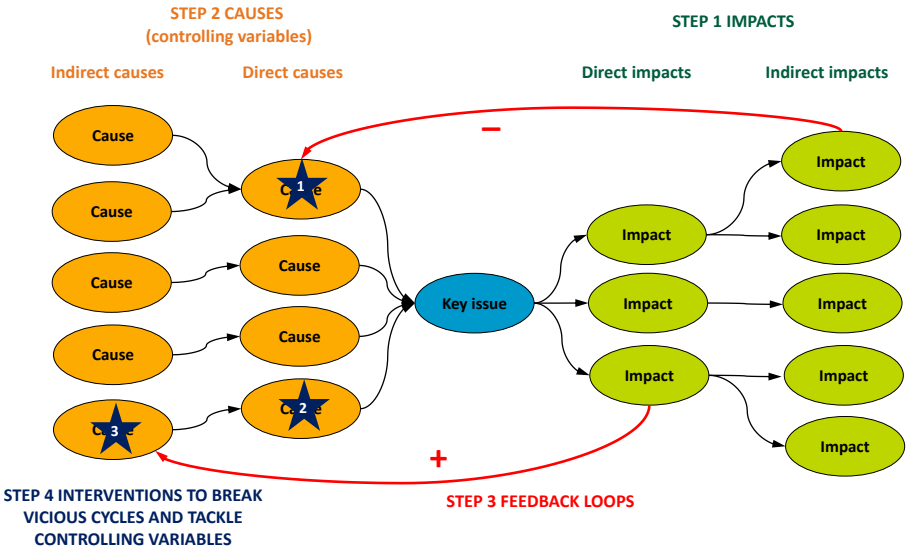

Figure 59 Template for considering interventions

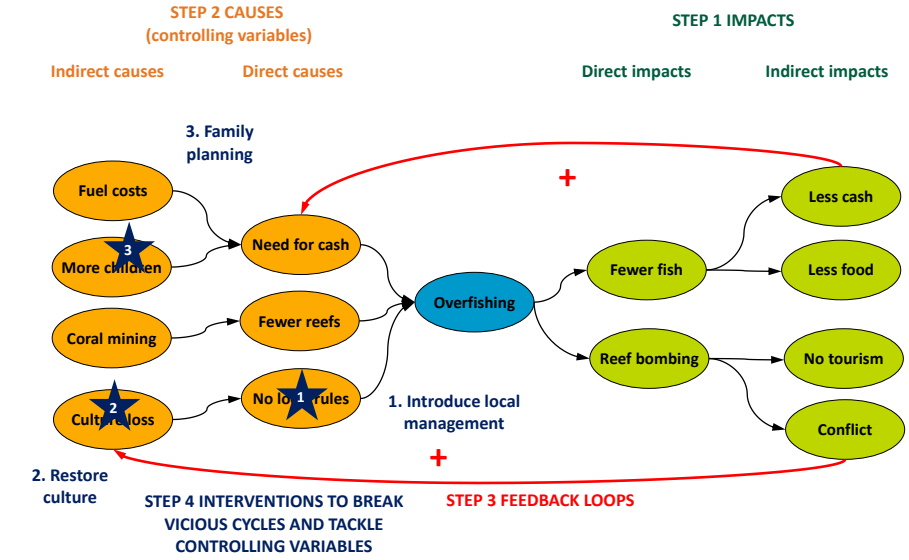

Figure 60 Fisheries example

An action plan can then be developed for each specific intervention. Below is an example of an action plan for introducing local management of fisheries.

ACTION	RESPONSIBILITY (WHO)?	WHEN?
1. Review current management arrangements	• Government • NGO • Researchers etc	Date and who?
2. Develop and fund locally appropriate management plan	• Government • Donor • Local leaders • NGO • Researchers	Date and who?

Figure 61 example action plan

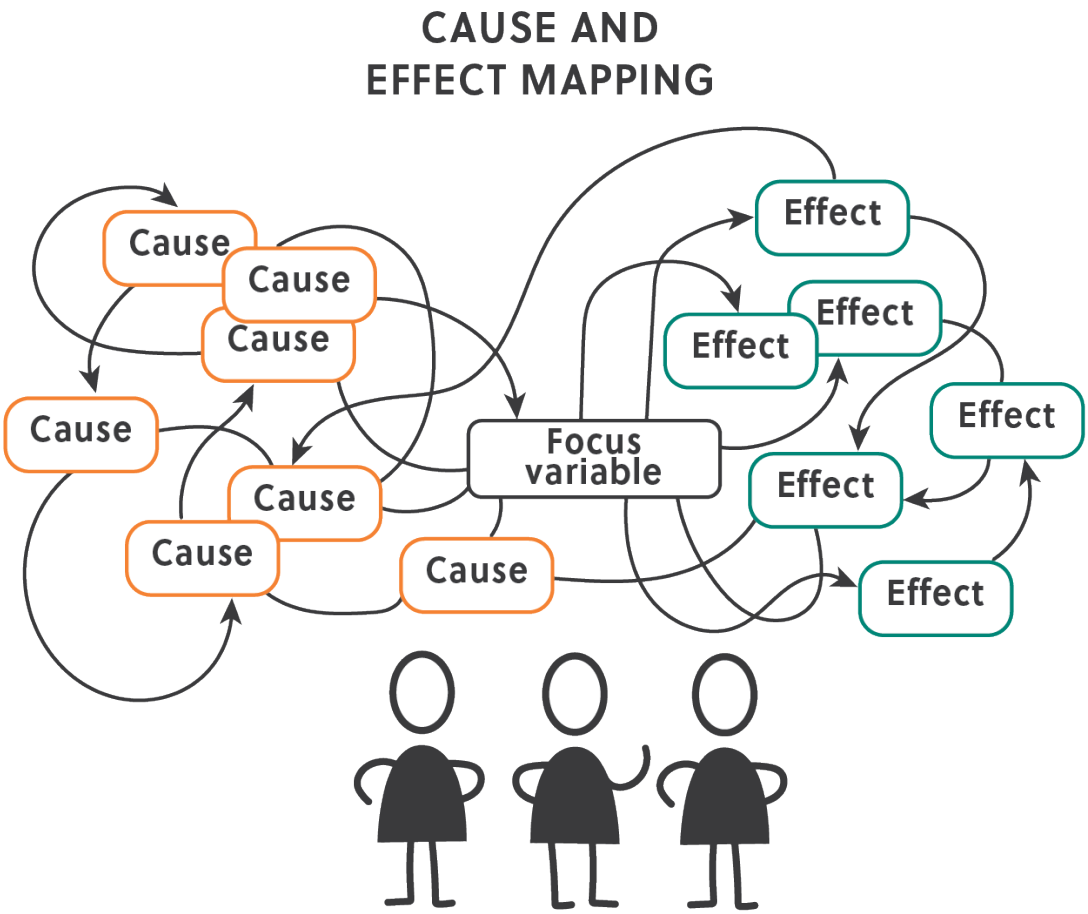

Figure 62 Causal loop – cause and effect mapping. Source: Australian Government, Department of Home Affairs. 2019. Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making. 3 Guidance on Vulnerability CC-BY-4.0

References and additional resources

If you would like to watch a YouTube video on this module, please see: https://www.youtube.com/playlist?list=PLa3eWR75XNLxlRG-XYzLb8VHcGCBCrdOX

Resources

If you are interested in conducting a causal loop analysis in your study of a system you can access:

YouTube video on causal loop
https://www.youtube.com/watch?v=u-MPKeE_CC8

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Your notes

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