Climate Resilient Planning Kit

A toolkit to improve resilience of Basic Service Delivery Systems

BRACED KNOWLEDGE MANAGER

BOOKLET 2: WORKED EXAMPLES

Climate Resilient Planning Kit:
A toolkit to improve resilience of Basic Service Delivery Systems.

BOOKLET 2: WORKED EXAMPLES

Authors: Mariana Matoso & Guy Jobbins

Design: Nicky Barneby

This is the second of three booklets introducing a toolkit for strengthening the resilience in basic service delivery systems. Booklet 1 contains the main toolkit and worksheets. Booklet 2 contains worked examples from projects in Nepal and Senegal. Booklet 3 contains the toolkit worksheets only, which may be printed and used separately.

Acknowledgements

The authors would like to thank Dave Wilson (Itad) and Jonathan Stone (Tearfund) for their most helpful comments in reviewing an earlier draft of the manuscript. We would also like to thank staff from International Development Enterprises and the Consortium pour la recherche économique et Sociale for their assistance in facilitating field work in Nepal and Senegal, respectively.

Table of Contents

Background to Two Example Projects
Solar Multiple Use Systems in Nepal

Solar Powered Multiple Use System (Solar MUS) uses solar power to pump water from a source up to a community living on higher ground. The pumped water is collected in the reservoir and distributed through a gravity system among the households for domestic and productive end uses.

Background

Tanke community is located in Anekot Village Developmet Committee (VDC) of Kavre district, which is 52 km away from Kathmandu and 20 km from the district headquarter. The site enrolled 59 households (316 people – 155 male and 161 female) with multiple ethnicities.

Components

The components of Solar MUS are: Intake, Reservoir Tank (RVT), Solar Panel, Distribution Chamber, Pipeline and Tapstand

Features of SMUS

1. Solar is an appropriate renewable technology in this village, given that there is abundant sunlight for most of the year.
2. The MUS project has a life time of 20 years, which includes the solar pumping systems. Systems are deliberately simple to maintain, and communities are trained to ensure that they can undertake minor maintenance procedure themselves.
3. MUS generates income through high-value agricultural crops, making it easier for households to pay user fees.
4. The project attempts to develop viable institutional and financial models in orders to initiate wide-scale replication of Solar MUS approaches.

Background to Two Example Projects
Integrated Urban Flood Management in Senegal

Each year, floods in Dakar's informal settlements damage property and put people's health at risk. Improving drainage reduces flood risk, and captured and treated flood waters can be used for watering urban gardens.

Background

The project works in Dakar's informal neighbourhoods to build flood resilience and improve the livelihoods of 920 000 people. These worksheets show examples from the informal area of Ben Barack.

Components

The main project components are drainage pipes and intakes, and anaerobic reactors and waste stabilisation ponds used to treat the flood waters. Operations and maintenance staff are also crucial to making sure that repairs are done quickly.

Features of integrated urban flood management

1. Installing infrastructure to drain, capture and treat flood waters, and distribute them to urban gardens. This also includes solid waste management and recycling, to reduce blockages of drainage pipes and intakes.
2. Supporting municipal policy by developing district flood maps and contingency plans, and providing national policy advice.
3. Providing training and raising awareness of local people for solid waste recycling, and building participation and ownership of infrastructure beneficiaries and key stakeholders, with a special focus on empowering women.

How does the Toolkit work?

This Toolkit provides you with a "thinking process". You can either follow the steps one after the other, or you can "pick and mix" them.

Assess resilience:
Should resilience be a high, medium or low priority in my intervention?

- **Worksheet 1** Guidelines
- **Worksheet 1** Assessment

Identify hazards:
What hazards might affect the area of my intervention?

- **Worksheet 2** Guidelines
- **Worksheet 2** Inventory of hazards

Identify Service Components:
What components are involved in my intervention, and how critical are they to continuing service?

- **Worksheet 3** Guidelines
- **Worksheet 3** Inventory of service components
- **Optional Exercise 1** Mapping systems configuration and vulnerabilities hotspots

Diagnose impact on intervention:
How are service components vulnerable to hazards, and how can I reduce that vulnerability?

- **Worksheet 4** Guidelines
- **Examples of Mitigation Measures**
- **Worksheet 4** Impact pathways
- **Optional Exercise 2:** Prioritisation matrix

Developing an action plan:
What concrete and realistic measures can I implement?

- **Worksheet 5** Guidelines
- **Worksheet 5** Action plan

Assessment

TASK 1

Worksheet 1

The first task is to consider how important resilience might be for your project.

The first worksheet uses a simple scoring system to help you decide whether a focus on resilience should be a high, medium or low priority in your intervention.

Assess Resilience: Is resilience a priority for my project?

TASK 1

Worksheet 1 Guidelines

This first exercise helps you assess whether or not a focus on resilience in your service delivery project should be treated as a high, medium or low priority, and whether or not you should continue working through this Toolkit.

Worksheet 1's simple scoring system can help you decide and build consensus about how important resilience is to your project. In principle it is a good thing for all projects to consider resilience. Often, projects can be made much more resilient without needing many additional resources so long as the risks to continued service delivery are identified and addressed in advance. However, sometimes it might be necessary to make choices about what to focus on.

© Mariana Matoso, 2015

Note: Resilience should be treated as a high priority if extreme events and disasters pose a risk to the service you are building, or if your service is crucial to the resilience of beneficiary people and communities.

If the score suggests resilience is a low priority, but you think hazards and extreme events may pose a significant threat to your project or service, ignore the score and continue to the next Guidance Sheet.

Assessment
Nepal

TASK 1

Worksheet 1

Step 1: ***Think and describe*** – what intervention are you designing/implementing/evaluating?

a. What service are you delivering (e.g. health, education, water, sanitation)? ***Solar MUS; multiple use water system***

b. Where is it located? ***Tanke, Anekot VDC, Kavre***

c. Who benefits? (e.g. women/elderly/youth, social groups, etc.)_____

Step 2: With that information in mind, **Answer** Yes ✔, No ✘, or Don't Know **?** to each question below

		✔	✘	?
1	Is the project located in an area prone to **natural hazards**? *Examples: earthquakes, landslides, tsunamis, volcanic activity, avalanches, floods, extreme temperatures, drought, wildfires, cyclones, storms/wave surges, disease epidemics and pest outbreaks*	●		
2	Have similar projects in this area experienced impacts as a result of natural hazards?		●	
3	Is the project located in an area experiencing or susceptible to **complex emergencies**? *Examples: humanitarian crisis, hindrance or prevention of humanitarian assistance by political and military constraints; tribal conflict, food insecurity, epidemics; conflicts and displaced populations*	●		
4	Have similar projects in this area experienced impacts as a result of complex emergencies?			●
5	Is resilience-building or disaster risk reduction a significant focus of the intervention you are designing/developing/implementing?	●		
6	Does the project deliver basic services (e.g. health, education, water, sanitation) that allow community/households/individuals to improve their **coping ability** when hit by a natural hazard or complex emergency?	●		
7	Does the project deliver basic services (e.g. health, education, water, sanitation) that allow community/households/individuals to improve their **ability to recover quicker** when hit by a natural hazard or complex emergency?	●		

Total ticks ✔		5
Total Don't Knows **?**	+	1
Total score	=	6

Top tip!
If your assessment score has many Don't Knows, seek more information from colleagues, local people, technical experts and other development partners and sources of information. You can carry on with the other Guidance Sheets and exercises for now, but as more information becomes available your assessment and diagnosis can be refined. It is a good idea to do this before significant resources are committed to new activities!

Note: If you answered Yes ✔ to questions 5, 6 or 7 you should treat your project as ! high priority, regardless of the total score.

Now turn the page to calculate the priority for a focus on resilience in your project using your Total score.

Assessment
Senegal

TASK 1

Worksheet 1

Step 1: ***Think and describe*** - what intervention are you designing/implementing/evaluating?

a. What service are you delivering (e.g. health, education, water, sanitation)? ***Integrated water and sanitation project***

b. Where is it located? ***Ben Barack, Dakar***

c. Who benefits? (e.g. women/elderly/youth, social groups, etc.) ***Most vulnerable groups, with a special focus on women and youth***

Worked example: The team in Senegal decided not to complete Worksheet 1. They already knew that building resilience was a project objective and needed to be addressed as a high priority.

Step 2: With that information in mind, **Answer** Yes ✔, No ✘, or Don't Know **?** to each question below

		✔	✘	?
1	Is the project located in an area prone to **natural hazards**? *Examples: earthquakes, landslides, tsunamis, volcanic activity, avalanches, floods, extreme temperatures, drought, wildfires, cyclones, storms/wave surges, disease epidemics and pest outbreaks*	○	○	○
2	Have similar projects in this area experienced impacts as a result of natural hazards?	○	○	○
3	Is the project located in an area experiencing or susceptible to **complex emergencies**? *Examples: humanitarian crisis, hindrance or prevention of humanitarian assistance by political and military constraints; tribal conflict, food insecurity, epidemics; conflicts and displaced populations*	○	○	○
4	Have similar projects in this area experienced impacts as a result of complex emergencies?	○	○	○
5	Is resilience-building or disaster risk reduction a significant focus of the intervention you are designing/developing/implementing?	●	○	○
6	Does the project deliver basic services (e.g. health, education, water, sanitation) that allow community/households/individuals to improve their **coping ability** when hit by a natural hazard or complex emergency?	○	○	○
7	Does the project deliver basic services (e.g. health, education, water, sanitation) that allow community/households/individuals to improve their **ability to recover quicker** when hit by a natural hazard or complex emergency?	○	○	○

Total ticks ✔		
Total Don't Knows **?**	+	
Total score	=	

Top tip!
If your assessment score has many Don't Knows, seek more information from colleagues, local people, technical experts and other development partners and sources of information. You can carry on with the other Guidance Sheets and exercises for now, but as more information becomes available your assessment and diagnosis can be refined. It is a good idea to do this before significant resources are committed to new activities!

Note: If you answered Yes ✔ to questions 5, 6 or 7 you should treat your project as ❗ high priority, regardless of the total score.

Now turn the page to calculate the priority for a focus on resilience in your project using your Total score.

Assessment

TASK 1

Worksheet 1

Ranking

Score your ranking using your Total score from above

If your score is 4–7
Resilience should be a high priority for your project. We strongly advise that you continue using this Toolkit and go to Guidance Sheet 2. Wherever possible, projects in this category should ensure that resilience and disasters are treated systematically in project framing and planning, and that sufficient resources and expertise are available to support them. This Toolkit will be just a first step for high priority projects, but it will help you identify areas where support is needed.

If your score is 2–3
Resilience might be a priority for your project, but more analysis is needed. For now, we advise that you continue to use this Toolkit and progress to Guidance Sheet 2.

If your score is 0–1
Resilience may not be a priority for your project. However, if you have time completing this Toolkit will be useful to confirm this assessment, and may help identify measures to strengthen service delivery.

A focus on resilience is
(circle as appropriate):

HIGH PRIORITY

MEDIUM PRIORITY

LOW PRIORITY

Proceed to Task 2:
INVENTORY

If your score suggests resilience is a ◆, but you think hazards and extreme events may pose a significant threat to your project or service, process with the tool.

Inventory

TASK 2

Worksheets 2 & 3

Now that we have established that incorporating resilience into your project is likely to be important, we can start exploring why.

This section of the Toolkit will guide you through that process, by helping you identify and list:

1. **Main hazards affecting the project,** as this will help you anticipate long-term risks, and help you prepare a plan for absorbing and adapt to them.
2. **Project components necessary to maintain service delivery during, or in the aftermath of a crisis,** as this will help you get a better sense of what resources you have at your disposal, how replaceable they are and what would happen to your service delivery system if they failed for any reason.

By the end of this exercise you will have a better understanding of what hazards might affect your project but also what kind of resources you have at your disposal and whether or not these will support a higher level of resilience.

Inventory of Hazards
Nepal

TASK 2

Worksheet 2

Name of hazard	Frequency	Widespread	Impact			Likelihood of negative impact on your intervention
			Disruption to general life:	People:	Infrastructure:	
Earthquake	*Since the big quake of 7.8 magnitude that struck Nepal on 25 May 2015, huge amount of aftershocks are occurring frequently.*	*It covers the whole area of Tanke VDC including the coverage area of Solar MUS (from source to water taps).*	*People faced several problems after the quake. According to local community, shops and markets were closed for 2 months leading to negative impact on their ability to recover and return to the normality of their daily lives (at both a social and economic level).*	*1 child died and 40 people were injured.*	*Damages to structures like buildings were significant. About 90% of buildings in Tanke VDC were destroyed and 2 solar panels (components of installed Solar MUS) were damaged too.*	*Moderately*
Flooding	*Tanke VDC is located in a flood-prone area. Floods occur annually mostly during spring season (June–July).*	*Floods affect all the households settled downstream of the flooding hills along with half of the irrigation lands of this community.*	*Flooding has damaged crops and polluted water.*	*Occurs annually in the monsoon. One of the most devastating floods took place 12 years ago, claiming the lives of many school children and women.*	*Flooding has damaged houses and other public buildings.*	*Highly likely*

Inventory of Hazards
Nepal

TASK 2

Worksheet 2

Name of hazard	Frequency	Widespread	Impact			Likelihood of negative impact on your intervention
			Disruption to general life:	People:	Infrastructure:	
Landslides	*Every few years there are small landslides occuring at the top of the hills, but frequency of slides into stream banks is increasing.*	*Covers the sloping hills and down to the upper hills.*	*No impact has been felt.*	*No impact has been felt.*	*No impact has been felt.*	*Unlikely*
Droughts	*It occurs rarely once or sometimes twice every 10 years. But according to the local community droughts have increased in the last few years.*	*Across Tanke VDC.*	*Mostly it damages small crops like vegetables. It directly affects people's incomes and overall livelihoods.*	*Water availability declines.*	*No impact has been felt.*	*Unlikely*
Lightning	*Usually lightening occurs every year in the hills of Tanke VDC but it is uncertain and no pattern has been identified.*	*It is a site-specific impact and could occur at any place.*	*In the past, it has destroyed trees and houses.*	*People have died in the past.*	*Direct lightning in the solar panels has caused damaged in the past.*	*Moderately*

Inventory of Hazards
Senegal

TASK 2

Worksheet 2

Name of hazard	Frequency	Widespread	Impact			Likelihood of negative impact on your intervention
			Disruption to general life:	People:	Infrastructure:	
Flooding	*During the wet season (July–October) 75% of annual rainfall falls within only 8 weeks. Heavy downpours in this period lead to flooding that regularly remains in place for 2–4 months. In the worst-affected areas the flooding is permanent.*	*More than half of the entire neighbourhood gets flooded*	*During the 2008 floods, which were less extensive than those of 2009, 27% of flooded households in the cities of Pikine and Guédiawaye experienced food insecurity, temporarily or permanently reducing the number of daily meals.*	*Women suffer disproportionately from flooding. They generally shoulder the increased burden of household work because the more challenging surrounds and daily routines. Their economic opportunities are also restricted, as they are generally employed in the informal economic sector, which does not function during or after the flooding (markets, roadside stalls, etc.), resulting in increased financial pressure on women and households. Children are especially prone to suffer from water-borne diseases.*	*Floods have caused major damage to housing, schools, health centres, roads, markets and places of worship. Most houses have individual septic tanks, which are unable to be sunk deep into the ground because the high groundwater table. Flooding therefore causes them to overflow, mixing sewerage with floodwater, polluting both ground and drinking water.*	*Highly likely*

Inventory of Service Components
Nepal

TASK 2

Worksheet 3

Service components

Type of service component	Priority level	Type of service component	Priority level	Type of service component	Priority level
Hardware		**Consumables**		**People**	
Intake	●	*Sunlight*	●	*MUS user group*	●
Storage tanks	●	*Water*	●	*Caretaker*	●
Pipeline	●	*Cement*	●	*Local staff/technical staff*	●
Solar panels	●	*Sand*	●	*Solar company*	●
Control units	●	*Aggregates*	●	*Local youth group*	●
Tapstand	●	*Stones*	●	*Engineer*	●
Micro-irrigation	●	*Chlorine*	●	*Skilled mason*	●

Option 1
proceed to Task 3: **DIAGNOSIS** where we will guide you through a more systematic way of thinking about how the hazards will impact the service components you have identified

Option 2
Do the **optional participatory exercise**, where we will guide you on how to map your system's configuration and get you to identify potential hotspots of vulnerability

Inventory of Service Components
Senegal

TASK 2

Worksheet 3

Service components

Type of service component	Priority level	Type of service component	Priority level	Type of service component	Priority level
Hardware		**Consumables**		**People**	
Drainage pipes	●	*In this technology no consumables are used*		*O&M staff*	●
Anaerobic reactor	●			*Users*	●
Waste stabilisation pond	●				

Option 1
proceed to Task 3: **DIAGNOSIS** where we will guide you through a more systematic way of thinking about how the hazards will impact the service components you have identified

Option 2
Do the **optional participatory exercise**, where we will guide you on how to map your system's configuration and get you to identify potential hotspots of vulnerability

Optional Exercise 1: Mapping system configuration and vulnerability hotspots

TASK 2

Mapping Guidelines

Why do the mapping?

This is an optional exercise designed to help visualise and map how natural hazards might impact the components of your system.

By the end of this exercise, you will have identified:

- Where your system of service delivery might be most vulnerable to the direct impact of hazards; and
- Where and how you might want to prioritise resilience measures and to distribute the resources you have.

How to do the mapping?

Step 1: **Engage different stakeholders**

This is a participatory exercise and we encourage you to get input from a wide range of people (e.g. beneficiaries, including women, children, and any particularly vulnerable groups of people, local authorities, colleagues and experts) so that you can jointly analyse and share knowledge about the intervention area and the system configuration.

Step 2: **Draw the map**

1. Draw a rough sketch map of the area you are serving, highlighting **key geographic features** (rivers, mountains, hills, flood plains, forests, sea, towns, villages, etc.).
2. Draw **where the beneficiaries/clients of your service are** (pupils, patients, water users, etc.).
3. Draw the **layout of your infrastructure** (pipes, buildings, pump houses, etc).
4. Draw any **access routes** that beneficiaries use to access your service (paths, standpipes, roads, etc.).
5. Draw any other assets that your service requires, particularly:
   a. Access to electricity and clean water
   b. Staff (where they live)
   c. Stores of equipment
   d. Stockpiles of consumables
6. **Highlight on the map any areas that may be** (or that you know are) **prone to specific hazards** – e.g. forest fires in forest areas, floods near rivers or the sea, landslides near uplands and slopes.

Step 3: **Analyse the map**

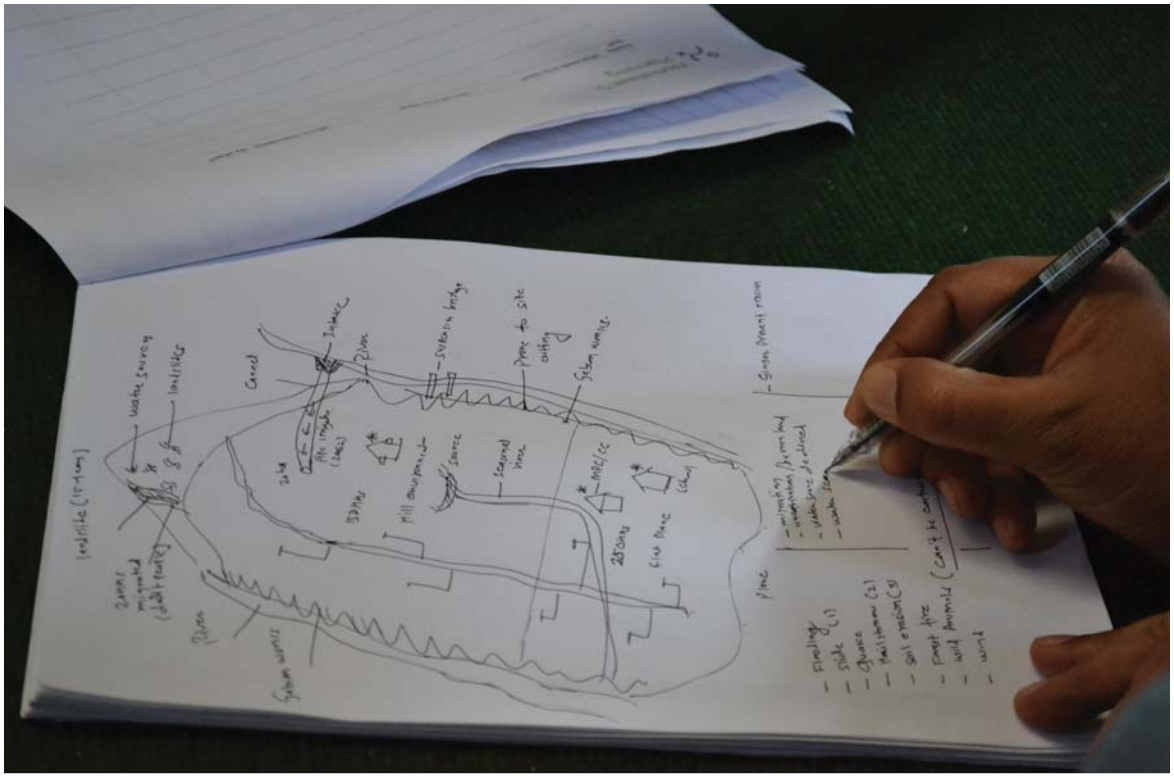
1. **Which assets/components are particularly exposed to hazards?** Is the school in a valley that floods after heavy rain?
2. **Where do hazards threaten the continued availability of the service?**
   a. Would damage to pipes or pumps mean that water can't reach standpipes or distribution points?
   b. Might stores or stockpiles be damaged or degraded?
   c. Might buildings be made unsafe or unusable?
3. **Where might hazards limit access to services?**
   a. Might damaged roads mean children cannot get to school?
   b. Might damaged roads mean that engineers cannot reach and repair damaged pipes?
   c. Might doctors and health care workers not be able to reach isolated villages?

Optional Exercise 1: Mapping system configuration and vulnerability hotspots

TASK 2

Mapping Guidelines

4. **Where might hazards affect the safety of services?**
   a. Could seepage from damaged septic tanks contaminate water supplies?
   b. Could electricity cuts affect cold storage for medicines?
   c. Could floods put children at risk on their way to school?
5. Circle areas of the map where you can **identify single points of failure or potential bottlenecks**.
6. Circles areas of the map where you are able to **identify potential hotspots of vulnerability**.



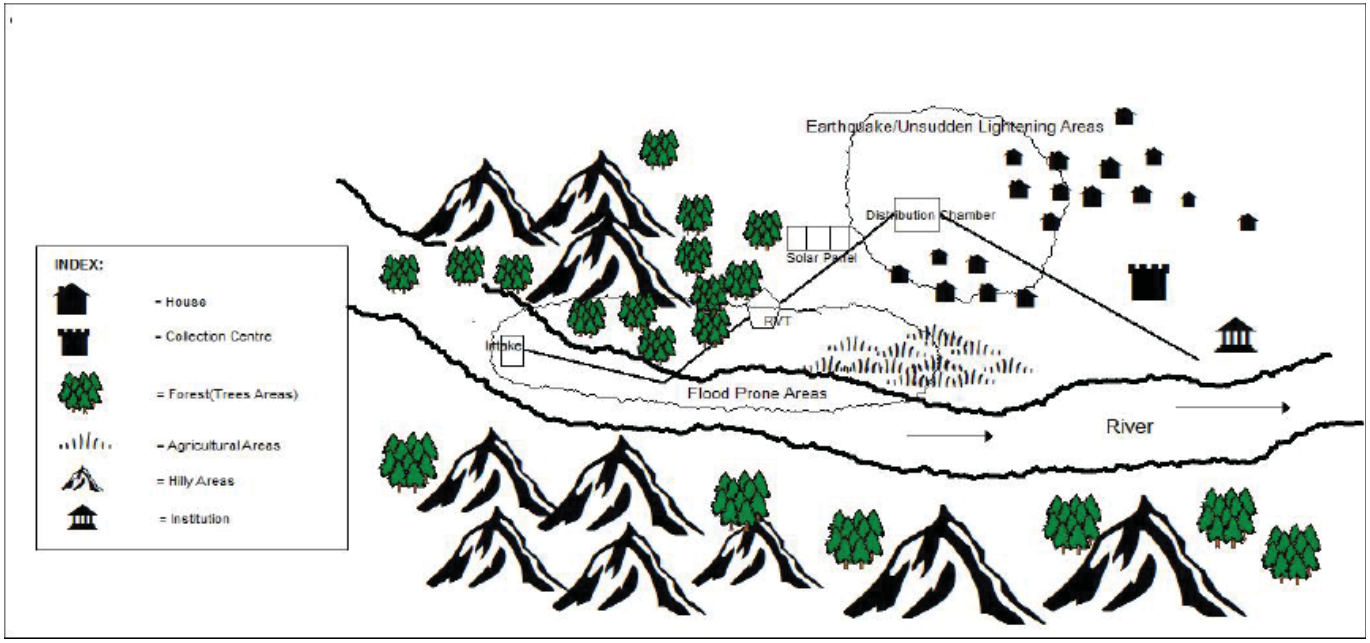
© Mariana Matoso, 2015

Top tip!
When using this toolkit in a participatory setting with communities and grassroots organisations, it can be useful to do this Optional Exercise first before completing any of the Worksheets. Mapping the intervention together ensures that everyone is involved in identifying service components and hazards, and agrees on what is being discussed.

Optional Exercise 1:
Nepal

TASK 2

Mapping Worksheet



Worked example: Mapping the layout of the MUS helped the team think about hazards to different components of the system. Intakes and storage tanks are more exposed to flooding, while the solar panels, distribution centre and users' houses are more exposed to earthquakes and lightning strikes.

This started a conversation about how hazards have impacts, and people agreed that earthquakes can have big impacts on the intake pipes, even if the intake pipes aren't in the area most directly affected by earthquakes.

Diagnosis

TASK 3

Worksheet 4

Looking back at your journey through this tool, so far we have helped you:

1. Determine the focus and priority your project should place on building resilience.
2. Take stock of which hazards might affect the project area and the project itself.
3. Assess what kind of service components (hardware, consumables and people) you have in the project; also how to prioritise them in terms of the consequences should they fail, be damaged or become unavailable.
4. And if you have done the mapping exercise, you will have started to think about where and how you might want to prioritise resilience measures across your system and to distribute the resources you have.

With this in mind, **we now move on to help you think about impact pathways and specific measures for mitigating the risks to service delivery.**

Impact Pathways
Nepal

TASK 3

Worksheet 4

Worked example: The team in Nepal found they had many hazards and possible impacts to consider, and used Optional Exercise 2: Prioritisation matrix to help prioritise their mitigation measures.

Level 2 or 3 hazard	High/ medium priority service component (hardware, consumable, people)	Impact	Service delivery:			Mitigation measure:	Priority level
			Availability:	Access:	Safety:		
Earthquake	*Intake*	*Owing to rapid shaking of earth crust, there may be a decrease of water source at the intake intake/source. Intake may crack too.*	*No water flow/ or reduced water flows in the system.*	*Limited or no flow at the taps and people do not get water/ sufficient water.*	*Possiblity of water contamination.*	*Design robust intake.*	*High*
	Storage tanks (RVT)	*RVT can be cracked or damaged. There is a chance of flooding to the downstream of the RVT.*	*Water can't be stored for irrigation and drinking use.*	*Beneficiaries will not be able to get water from the system.*	*Possiblity of germs, contamination and turbidity increases. If storage tank cracks or gets destroyed, flooding of water could impact people downstream.*	*Site selection – rocky and flat area along with stable zone. Sound design.*	*High*

Impact Pathways
Nepal

TASK 3

Worksheet 4

Level 2 or 3 hazard	High/medium priority service component (hardware, consumable, people)	Impact	Service delivery:			Mitigation measure:	Priority level
			Availability:	Access:	Safety:		
Earthquake (cont.)	*Taps*	*May damage the small water taps.*	*Water availability may decrease because earthquake shaking/cracking of earth can weaken the foundation of the taps.*	*Water might not flow at the tap level, but people can still get water directly by tapping the pipes.*	*No major threat to people's security.*	*If damaged, tapstand should be repaired.*	*Medium*
	Chlorine	*Collection centre where chlorine is stored was destroyed and much of the stock was lost.*	*Levels of availability will be reduced because stock might have been destroyed or people responsible for ensuring water quality might have been injured or unable to travel.*	*People can have difficulty accessing the storage building because it collapsed or it became inaccessible owing to road blockades.*	*Water quality might deteriorate, putting people at risk from water contamination.*	*Identify different points in Tanke where chlorine can be stored.*	*High*

Impact Pathways
Nepal

TASK 3

Worksheet 4

Level 2 or 3 hazard	High/medium priority service component (hardware, consumable, people)	Impact	Service delivery:			Mitigation measure:	Priority level
			Availability:	Access:	Safety:		
Earthquake (cont.)	*Caretaker, local staff/technical staff/ engineer*	*These people might be injured or even die.*	*If there is only a small number of people trained in those functions their availability might diminish if they get injured.*	*These people might get trapped somewhere and be unable to perform their duties.*	*If the caretaker is unable to perform his/her duties and if any infrastructure has been destroyed the time to fix it will be longer.*	*Train multiple people across the MUS Committee on different functions.*	*High*
Flooding	*Pipes*	*Pipes are laid along the river (as there is no other option), but pipes end up being washed away by the floods.*	*Water will have to be cut off and stop flowing.*	*People will not be able to access water because water will be cut off on both taps and storage tanks.*	*No major threat to people's security.*	*HDPE pipes must be replaced by GI pipes in the vulnerable sections. Gabion protection should be constructed at the upstream bank site.*	*High*
	Intake	*Filling up of the intake with external debris (e.g. stones and trees).*	*Water supply to the tanks may stop or be reduced.*	*Minimum or no water left for people to use.*	*No major threat to people's security.*	*Protection upstream.*	*Highest*

Impact Pathways
Nepal

TASK 3

Worksheet 4

Level 2 or 3 hazard	High/medium priority service component (hardware, consumable, people)	Impact	Service delivery:			Mitigation measure:	Priority level
			Availability:	Access:	Safety:		
Drought	*Water source/intake*	*Water flow could decline.*	*Reduced flow to the system.*	*Reduced supply.*	*No major threat to people's security.*		*Low*
Lightning	*Solar panel*	*Solar panel could be damaged.*	*No water can be pumped up.*	*No water supply and beneficiaries are unable to access the service.*	*No major threat to people's security.*	*Lightning arrestor should be designed.*	*High*

Impact Pathways
Senegal

TASK 3

Worksheet 4

Level 2 or 3 hazard	High/medium priority service component (hardware, consumable, people)	Impact	Service delivery:			Mitigation measure:	Priority level
			Availability:	Access:	Safety:		
Floods	*Pipes*	*These usually get destroyed when flooding happens.*	*Pipes are unable to perform and wastewater flows through the system.*	*Toilet becomes unusable and people struggle to find alternatives.*	*Wastewater gets mixed with drinking water sources leading to potential contamination.*	*We have already mitigated these risks in our project design. Reducing solid waste blockages, placing anaerobic systems and ponds on higher ground and using stronger materials and better designs will all reduce flood risk. We'll do this exercise again if there are problems in the future.*	*lLow – our design accounts for these risks*
	Anaerobic system	*Flooding causes the anaerobic reactor to fill up.*			*Untreated water overflows, posing risks to human health.*		
	Waste stabilisation pond				*Untreated water overflows, posing risks to human health.*		
	O&M staff		*During floods, O&M staff may be overstretched by needs to quickly fix problems in many neighbourhoods; this could delay repairs in some places.*	*Floods may make it difficult for O&M staff to reach affected neighbourhoods and fix problems quickly.*		*Identify and train local people how to fix basic problems in cases of emergency. This will make repairs faster and cheaper, and allow O&M staff to focus on the biggest problems.*	*High*

Optional Exercise 2:
Prioritisation matrix

TASK 3

Prioritisation Guidelines

Step 1: **List hazards and service components** you identified and prioritized in **Worksheets 2** (*highly and moderately likely to have an impact*) and **Worksheet 3** (*as medium and high priority to protect*).

Hazards (highly and moderately likely to have an impact) [from Worksheet 2]

_____

_____

_____

Service components (medium and high importance to protect) [from Worksheet 3]

_____

_____

_____

Step 2: **For each service component**, ask yourself and **circle the appropriate level in the scale**.

How important is it to protect this service component?

High Medium

How likely is the service component to be damaged by this hazard?

Moderate Major

In the look-up table below, find the letter where both scales meet.

		How likely is the service component to be impacted by this hazard? (From Worksheet 2)	
		Moderately likely	Highly likely
How important is it to protect this service component? (From Worksheet 3)	High	B	A
	Medium	C	B

A = Highest priority; B = High priority; C = Medium priority

Step 3: **List those service components that you identified as falling under**

Category '1' (highest priority):

_____

_____

_____

Category '2' (high priority):

_____

_____

_____

Use this Worksheet to fill in your answers over the page or, place over the page referring back to this one.

Optional Exercise 2:
Nepal

TASK 3

Prioritisation Worksheet

Hazard	Service component	Priority
Flooding	*Intake*	*Highest*
	Pipeline	*High*
Earthquake	*Storage*	*High*
	Intake	*High*
	Chlorine	*High*
	Staff/caretaker/engineer	*High*
	Tapstand	*Medium*
Lightning	*Solar panel*	*High*

You have now identified which service components are highest (category 1) **or high** (category 2) **priority** to protect because of the likely negative impact of a specific hazard.

With these in mind, you can now start thinking of a specific action plan (proceed to **Worksheet 5**).

Planning

TASK 4

Worksheet 5

Now it has become clear how hazards will impact certain service components and how you might be able to reduce the impact of those hazards through mitigation measures, it is time to devise a plan to action those.

In this final step of the Toolkit, we guide you through a planning table designed to help you think about next steps and determine:

a. What needs to be done;
b. How you plan to do it;
c. Who is responsible for it; and
d. By when you need it done.

Action Plan
Nepal

TASK 4

Worksheet 5

Title: *Tanke Resilience Action Plan 1*

Timeframe: *Next 3 months, then review*

People involved in putting it together: *MUS management committee and user groups*

Priority level	List mitigation actions	What needs to be done?	By whom?	By when?
Highest	*Protection of intake*	*I) Contact the engineer to design the protection of structure; II) Collect the construction materials and transport to the site; III) Contact the skilled mason and issue a contract.*	*Engineer, caretaker, MUS user group and skilled mason*	*Within 15 days*
High	*Replacement of HDPE pipes with GI pipes in the vulnerable sections*	*I) MUS management committee will mobilise the caretaker and identify the vulenerable area for pipe replacement; II) Measure the length of section for replacement of HDPE pipes by GI pipes; III) Anchorage should be done to the pipes by iron sheet so that pipes remains do not flow with water direction.*	*Caretaker, MUS user group and skilled mason*	*Within a week*
High	*Design and installation of lightning arrestor*	*I) Designing of lightning arrestor; II) Identify the place for arrestor installation; III) Provide training to the caretaker for understanding its tecehcnial performance/maintenance.*	*Engineer, solar company and MUS user group*	*Within 5 days*

Top tip!
Whenever possible consider involving many stakeholders as possible in this exercise. Discussing mitigation actions with communities and grassroots organisations you raise everyone's awareness of what needs to be done, by whom and when, and help create ownership.

Action Plan
Nepal

TASK 4

Worksheet 5

Priority level	List mitigation actions	What needs to be done?	By whom?	By when?
High	*Water source protection/watershed management*	*I) Design the bio-engineering structure like gabion wall; II) Issue the contract to the mason; III) Construct wall to protect RVT; IV) Call the project responsible person and arrange meeting with them; V) Work jointly with forest user groups for the plantation; VI) Plantation should be done.*	*MUS management committee, local youth club, forest user committee and local people*	*Within 25 days*
High	*Chlorine*	*Identify different points of storage across the village .*	*MUS management committee*	*Within 25 days*
High	*Caretaker, local staff/technical staff/ engineer*	*Train more people for maintaining and repairing the MUS.*	*MUS management committee with support from iDE*	*Within the next 3 months*

Action Plan
Senegal

TASK 4

Worksheet 5

Title: *Bene Barack Resilience Action Plan*

Timeframe: *Next 2 months*

People involved in putting it together: *Project staff*

Priority level	List mitigation actions	What needs to be done?	By whom?	By when?
1	*Make sure trained operations and maintenance staff are available during floods.*	*Identify people from different community based organisations and social groups working in Ben Barack, and provide them with training so they can quickly address problems during flood events.*	*Project staff*	*Within the next 2 months*

Top tip!
Whenever possible consider involving many stakeholders as possible in this exercise. Discussing mitigation actions with communities and grassroots organisations you raise everyone's awareness of what needs to be done, by whom and when, and help create ownership.

The BRACED Knowledge Manager generates evidence and learning on resilience and adaptation in partnership with the BRACED projects and the wider resilience community. It gathers robust evidence of what works to strengthen resilience to climate extremes and disasters, and initiates and supports processes to ensure that evidence is put into use in policy and programmes. The Knowledge Manager also fosters partnerships to amplify the impact of new evidence and learning, in order to significantly improve levels of resilience in poor and vulnerable countries and communities around the world.