Flood Resilience Alliance

Flood Resilience Measurement for Communities (FRMC)

Project set up, study set up, data collection, and grading

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floodresilience.net

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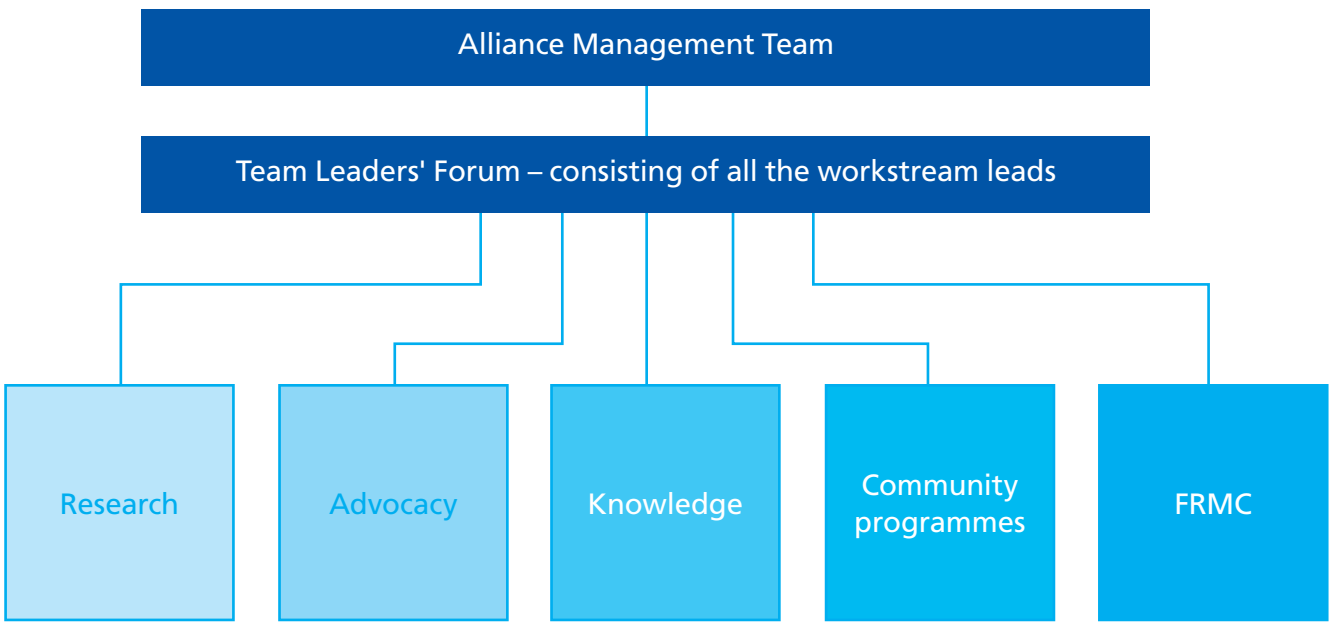
The Zurich Flood Resilience Alliance

Zurich Insurance Group (Zurich) launched a global flood resilience programme in 2013. The programme aimed to advance knowledge, develop expertise, and design strategies to help communities improve their ability to deal with the impact of floods, or build resilience to floods.

To achieve the programme's goals, Zurich formed a multi-year, interdisciplinary alliance (the Zurich Flood Resilience Alliance) to bring in complementary skills and expertise from different organizations. This enabled us to link academic insights, humanitarian sector capabilities, and risk management expertise to improve community resilience to floods.

Zurich works with the humanitarian and civil society organizations Concern Worldwide, the International Federation of the Red Cross and Red Crescent Societies (IFRC), Mercy Corps, Plan International, and Practical Action, as well as research partners the International Institute for Applied Systems and Analysis (IIASA), the London School of Economics, and the Institute for Social and Environmental Transition-International (ISET). Please visit www.zurich.com/flood-resilience and www.floodresilience.net for more details.

The Alliance works in the following areas, with a multi-organizational work stream for each:



Why floods?

Floods affect more people globally than any other type of natural hazard.

And the situation is getting worse, with:

- Increasing population, urbanization, and economic development in hazard-prone areas;
- Increasing loss of life and economic and insured losses due to floods;
- Increasingly interconnected and interdependent flood risks.

Why resilience?

We find: every US$1 invested in prevention saves $5 in future losses.[1]

But: only 13 per cent of aid spending goes into pre-event resilience and risk reduction; 87 per cent goes to post-event relief.[2]

We define resilience as the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives, while managing its disaster risk over time in a mutually reinforcing way.[3]

Why measure?

Measurement enables us to assess and demonstrate the real impact of improvements. Since there was no global framework available to do this, we needed to develop a consistent Flood Resilience Measurement Framework and the tools to implement it.

Also, if we have a measurement framework and data, we can contribute to the evidence on how to define resilience. In turn, this will help to increase social, political, and financial investment in building flood resilience.

Why focus on communities?

While acknowledging that national and global drivers play a significant (and essential) part in building flood resilience, we have chosen to focus on the community level. This is the level where flood impacts are felt most immediately and where much action on flood resilience can be taken. It is also the level where we can demonstrate tangible impact on people's lives, creating best practices in the field that can help us shape and influence policy at a higher level.

CONCERN worldwide · IFRC · International Institute for Applied Systems Analysis www.iiasa.ac.at · ISET International · LSE The London School of Economics and Political Science

MERCY CORPS · PLAN INTERNATIONAL · Practical ACTION · ZURICH

1 Mechler, R., Czajkowski, J., Kunreuther, H., Michel-Kerjan, E., Botzen, W., Keating, A., McQuistan, C., Cooper, N., and O'Donnell, I. (2014) 'Making Communities More Flood Resilient: The Role of Cost-Benefit Analysis and Other Decision-Support Tools in Disaster Risk Reduction', *White Paper*, Zurich Flood Resilience Alliance.

2 Kellett, J. and Caravani, A. (2013) *Financing Disaster Risk Reduction: A 20-Year Story of International Aid*, London: ODI; Washington, DC: Global Facility for Disaster Reduction and Recovery at the World Bank.

3 Keating, A., Campbell, K., Mechler, R., Magnuszewski, P., Mochizuki, J., Liu, W., Szoenyi, M., and McQuistan, C. (2017) 'Disaster resilience: what it is and how it can engender a meaningful change in development policy', *Development Policy Review* 35(1): 65–91 <http://dx.doi.org/10.1111/dpr.12201>.

Introduction

Why is flood resilience important?

Floods affect more people globally than any other natural hazard, and they can literally 'wash away' overnight what communities have spent years building up. All communities and projects need to understand local flood risks and how to increase resilience. This framework can help communities and project managers understand and address floods better in their work and daily lives.[4]

The purpose of the Flood Resilience Measurement for Communities (FRMC) framework is to:

At the local level.
Help guide community development, projects, and investments to maximize opportunities to increase community flood resilience.

At the global level.
Generate evidence and learning about what makes communities flood resilient in a wide variety of contexts.

What does flood resilience mean?

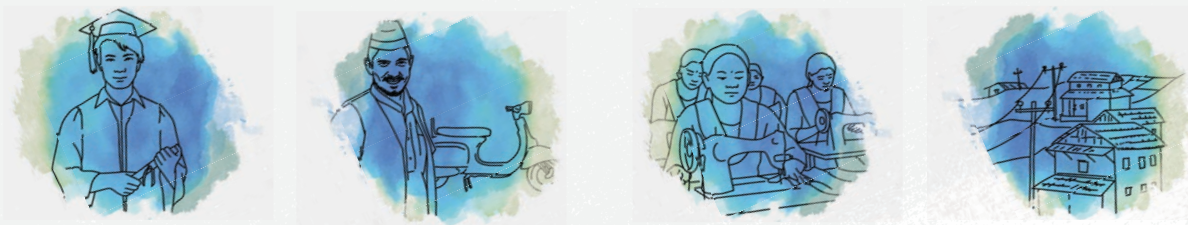
Simply put, flood resilience means that communities are able to improve their living conditions over time despite recurrent floods. The goal is that development continues, and poverty and inequality are overcome. Even where floods occur the goal is that floods do not 'wash away' everything communities have spent years building up, nor do they prevent their aspirations being realized. Flood resilience is about living – and thriving – with floods.[5] (Please see Figure 1 for the definition of resilience used by the FRMC.)

But why should we learn to live with floods rather than prevent floods? Floods cannot be completely prevented or avoided, and indeed some flooding is needed (for example some agriculture practices and wildlife areas rely on annual flooding). So we must learn how to develop and thrive even with floods occurring.

How do we define resilience

The ability of a system, community or society to pursue its social, ecological, and economic development and growth objectives, while managing its disaster risk over time in a mutually reinforcing way.

5-year development and growth objectives



Individual:
Get a degree

Household:
Buy a vehicle

Small business:
Expand production

Community:
Electrify the village

There is a flood event

Are the community members going to be able to achieve their goals in their planned timeframes?

Figure 1 How do we define resilience?

4 For more details on how the Alliance developed the measurement framework, see Keating et al. (2017).
5 For more information on the conceptual approach taken by FRMC please read: Keating et al. (2016).

What influences flood resilience?

Flood resilience is location-specific. This is because flood risks are different from place to place. Flood risks are the result of a combination of factors, as shown in Figure 2.

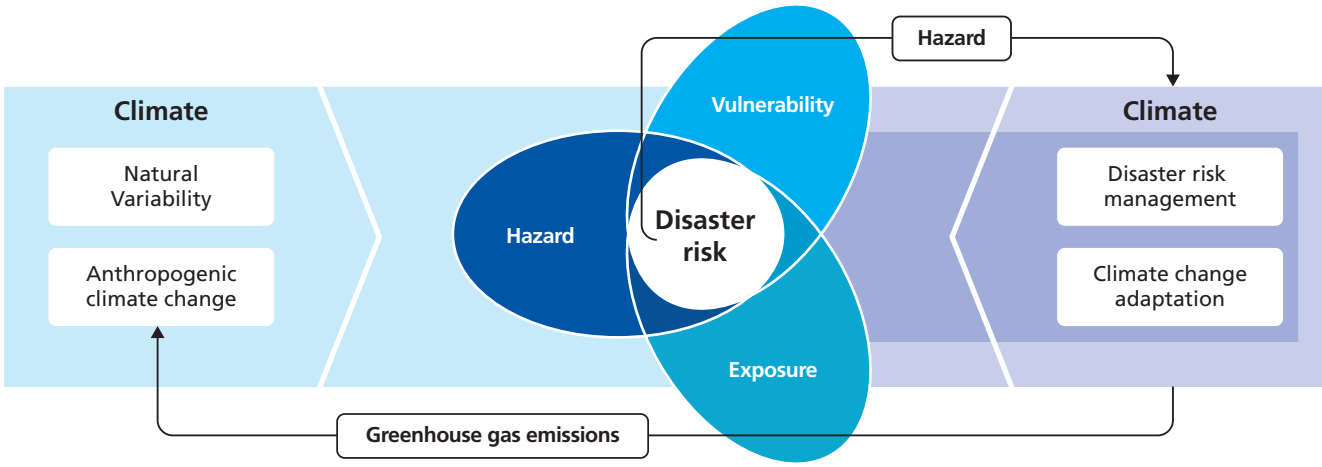


Figure 2 The IPCC AR5 conceptual framework with risk at the centre. Source: IPCC, 2012[6]

- **Hazard.** This is how often and how severely there is flooding.
- **Exposure.** This is how much of what people have and do (including their own safety) is exposed to that hazard, or is 'in harm's way'.
- **Vulnerability.** This is the extent to which what is in harm's way will suffer losses or damage from the hazard. For example whether houses will be undamaged, need some minor or major repairs, or completely collapse. Whether people can easily escape a flood and reach a safe place, or be trapped and suffer injury or even die. Whether livelihoods will be unaffected, disrupted for a short time until the flood subsides, or entire harvests and annual income are washed away.[7]

Vulnerability does not just relate to these obvious direct impacts; it also relates to the extent of the consequences of any losses or damage (or indirect impacts). For example, two neighbours could suffer the same damage to their homes, but one has insurance which pays for all the repairs while the other does not and cannot afford the repairs. The first neighbour is less vulnerable to exactly the same flood than the second because of the consequences of the damage. Compare also a modern town and a slum. These two communities could suffer a very similar flood (same hazard), and have the same number of homes, people, and services affected (same exposure), but the consequences on the lives of the inhabitants over the days, weeks, and even years after the flood could be dramatically different because of different vulnerabilities. Residents in the town may be helped

6 IPCC (2012) 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change', C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds), Cambridge and New York: Cambridge University Press.

7 Technical definitions used by FRMC can be found in the Glossary document. Vulnerability (of assets): Also known as physical vulnerability, as distinct from social or economic vulnerability. The conditions which increase the susceptibility of the asset to impacts from the flood hazard (see 'Hazard'). Vulnerability of physical assets is distinct from the location of the physical asset (see 'Exposure'). For example, two houses located next to each other on a flood plain have the same exposure, but different vulnerability because one is raised on stilts and the other is not. Vulnerable people/groups/population: Vulnerable groups can be defined by their diminished capacity to anticipate, cope with, resist, and recover from the impact of a natural or man-made hazard. The concept is relative and dynamic. Vulnerability is most often associated with poverty, but it can also arise when people are isolated, insecure, and defenceless in the face of risk, shock or stress. Examples of potentially vulnerable groups include: displaced populations who leave their habitual residence in collectives, usually due to a sudden impact disaster or conflict, as a coping mechanism and with the intent to return; migrants who leave or flee their habitual residence to go to new places; specific groups within the local population, such as marginalized (see 'Marginalized'), excluded or destitute people; young children, pregnant and nursing women, unaccompanied children, widows, elderly people without family support, and disabled persons. In a disaster, women in general may be affected differently from men because of their social status, family responsibilities or reproductive role, but they are not necessarily vulnerable. They are also resourceful and resilient in a crisis and play a crucial role in recovery. Gender analysis can help to identify those women or girls who may be vulnerable and in what way.

quickly by emergency services, be rehoused, have electricity and clean water supplies restored within days, and receive financial or food aid. However in the slum, they may receive no formal support at all. It may be impossible to access energy or clean water for months, they may not be rehoused and have to live among the flood waters and damaged settlement, exposing them to many further risks including water-borne diseases and injury.

This is what is meant by **physically, socially, or economically vulnerable** – the extent of loss and damage by both direct impacts (on people, assets, or buildings), but also the consequences of this (or indirect impacts) on people's ability to thrive (be safe, meet their needs, undertake their income generating activities).

This is why **flood resilience is location specific** and why FRMC generates in-depth, community-based research in each community. Without this community perspective it is impossible to understand and address flood risks, even for a technical specialist! How a community is impacted by floods – and what is needed to ensure that development and poverty reduction can continue even when there are floods – will depend on many factors related to the lives and location of the community. This is what FRMC asks us to find out about.

How does FRMC help me to understand community flood resilience?

FRMC is a way to investigate the question: What do people need to have and do to ensure that floods do not cause lasting harm to their lives and livelihoods?

Using FRMC we look at how communities can reduce flood risks, prepare for floods, respond to floods when they do occur, recover from floods, and avoid the build-up of more flood risk in the future. By working closely with the community, flood risks will become better understood and better incorporated into wider development plans and decisions.

To do this, FRMC uses 44 indicators called 'sources of resilience' to understand a community's location-specific flood risks: hazard, exposure, and vulnerability. Every source of resilience is broken down into a number of different questions that look at different factors that may be relevant for that source. After all the information has been collected, each source of resilience is given a score. In this way the process helps the community understand its strengths and weaknesses before a flood strikes, and can be used to identify actions that can increase flood resilience.

When do I use the framework?

The framework is used at the following times in the following ways:

- **Baseline.** This is the first use of FRMC in a community, using the 44 sources of resilience (also referred to as the first of a series of 'T-line studies' used to track flood resilience over time, this baseline or first application being T0).
  This sets a baseline understanding of flood resilience and is the foundation for an ongoing partnership with the community. Ideally this should be part of a project baseline, but it can be done as a standalone assessment.
- **Post-flood.** When a flood occurs it is important to go back to the community and gather information on what actually happened. This allows us to compare the assessment of flood resilience sources with what actually happened, and can also inform the design of post-flood recovery activities. The post-flood assessment uses 29 resilience outcome indicators, which are similar in structure to the sources of resilience. This data collection process must be planned and designed before a flood actually occurs (and ideally straight after the initial assessment, while the information and process is still fresh in the team's minds), so that it can be implemented in a timely manner after a flood occurs.
- **Endline/periodic assessment.** The framework can track progress over time if repeated at intervals (perhaps every one to two years) to understand whether flood resilience has

changed (positively or negatively). This is done by measuring the 44 sources of resilience in the same way as the baseline (T0). At a minimum, the baseline (T0) should be followed by a T1 at project end to provide a comparison, but ideally there will be a number of intermediary T-line applications between the baseline (T0) and the end. For example, in an 18-month project you would likely just assess the 44 sources of resilience twice (T0 at the start and T1 at the end), with perhaps one post-flood resilience outcome assessment. But with longer-term community engagement you may complete both types of assessment many times.

How will this guide help me use the framework?

This guide provides information and advice to help you gather high quality information working with the community. This guide has been written for everyone using FRMC. All frameworks and tools are only as good as the person using them; therefore this learning companion is intended to help you to get the most out of the process, to understand what it is asking you to do and why, to implement it well, working in partnership with the community, and as a result, to help flood-affected communities to thrive.

This guide focuses on helping field staff to understand why they are asking the questions they are asking and facilitate high quality data collection activities with community members. It is also intended to help project managers to make good choices when selecting the data collection methods for each source of resilience. This guide, however, is not intended to explain the entire project management process needed to implement FRMC. For this, please refer to other FRMC documents and training, particularly the Step by step guide to the process and software,[8] which includes on page 6 an outline of the complete process.

This guide provides:

- an introduction to what flood resilience is and how FRMC assesses it;
- advice on selecting methods of collecting the information;
- guidance on good community engagement and how to gather high quality information.

By using this framework you are:

- helping communities understand their flood resilience and actions they can take to improve it;
- generating location-specific information on flood risks vital to improving projects and planning;
- contributing to global learning aimed at improving flood resilience of millions of people worldwide.

Summary of key learning

- Flood resilience means that communities are able to improve their living conditions over time despite recurrent floods.
- Flood risks are location-specific, therefore each community is unique, and we need to learn about this before we can take actions that will successfully build resilience.
- Flood risks are a combination of hazard, exposure, and vulnerability.
- Vulnerability includes potential physical harm and other consequences for lives and livelihoods.
- FRMC works with communities to help them to understand their unique strengths and weaknesses. FRMC is implemented with communities and is primarily concerned with improving their flood resilience, but it also contributes to global learning about what improves community flood resilience.
- This guide will help people using FRMC to understand how to get the most out of the framework.

8 https://floodresilience.net/resources/item/frmc-step-by-step-guide-to-the-process-and-software

Overview of flood resilience in the FRMC

Because resilience is location-specific, how the FRMC is used will also be different in each location. The same framework and process is used everywhere – information (or data) is collected and the 44 sources of resilience are graded in every community – but how the data to grade the sources is collected and the corresponding questions that you ask, will be tailored to each community you assess. Similarly, after every flood, data is collected to grade the 29 resilience outcomes, but how this is done will be tailored (and planned in advance) for that particular community.

To do this well, every person involved in the data collection process must understand what is meant by resilience and how the FRMC assesses it. Therefore it is recommended that everyone involved in the data collection processes – from translators and enumerators right through to the team leader – reads this guide.

To get started you must understand your project from the perspective of flood resilience as described by FRMC. By establishing this understanding the framework can also be used to support project quality and learning.

The five capitals (5Cs)

FRMC uses a number of different lenses through which to look at flood resilience.[9] One of these lenses that many development practitioners will be familiar with is the five capitals (5Cs) from the 'Sustainable Livelihoods Framework'. FRMC uses the 5Cs to characterize what resources, assets, and capacities – known as 'capital' – a community has. You may know the terms 'capital' and 'assets' as financial terms, and the idea is the same for all the capitals: these are the stocks of things that the community or individuals have. But these are not just financial (such as income, cash savings, property value, or investment in a business or piece of machinery), these are all the things that people need to thrive. These 5Cs are characterized as **human, social, physical, natural, and financial** (Figure 3).

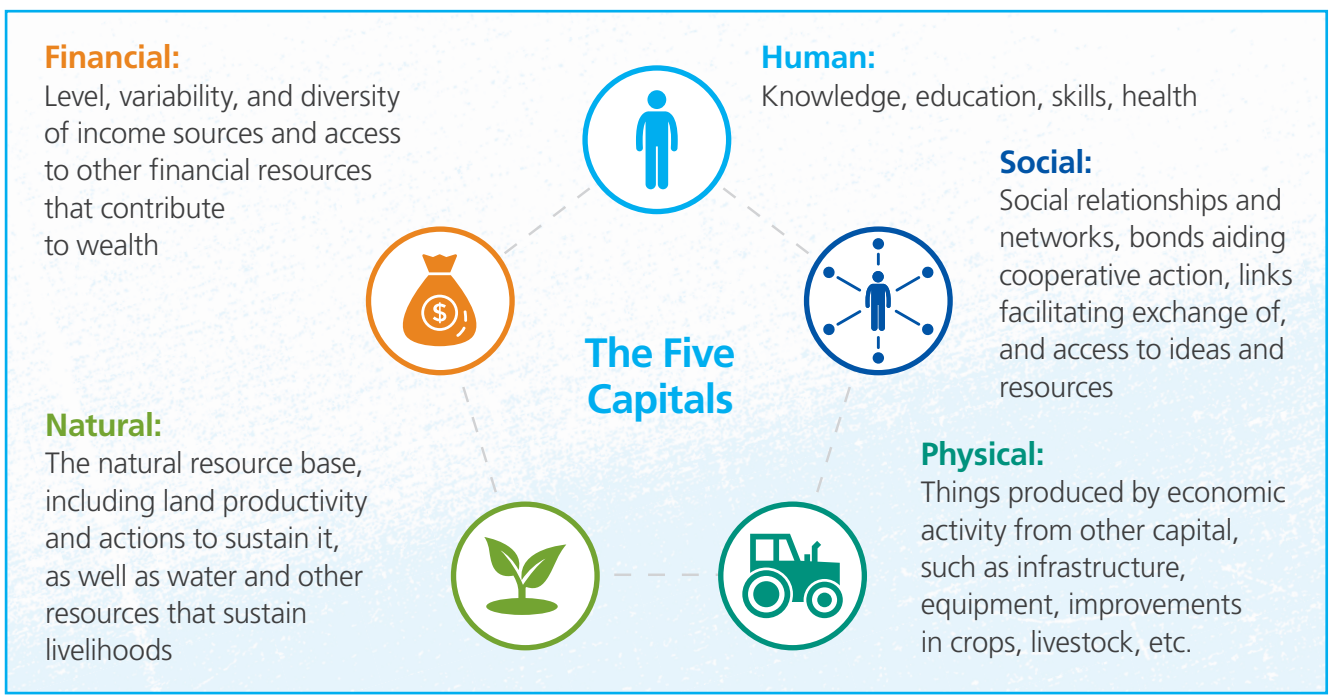


Figure 3 The five capitals

9 The FRMC uses a number of different lenses through which to look at flood resilience data and information. For examples of these lenses see pages 14–17 of the Easy Guide to the Process (and Software) behind the Flood Resilience Measurement for Communities.

Each of the 44 sources of resilience relate to one of the 5Cs. If these are used and managed well they can improve living conditions and reduce flood risks (remember, flood risks are the result of hazard, exposure, and vulnerability). However, if used and managed poorly they can increase flood risks.

What is social capital?

Social capital is defined as social relationships and networks, bonds aiding cooperative action, links facilitating exchange of and access to ideas and resources.

Social capital is the stock of personal and social connections between people living in the community which provide value and benefit to each other, and the degree to which people will work together or help each other.

As a result, social capital tends to be implicit (something which is not directly expressed, but instead a shared understanding among people involved) rather than explicit (something that would be obvious to see and measure). This is because it comes from social and cultural norms, and from the qualities of personal relationships. For this reason social capital is very different from group to group, and from community to community. Generally, groups with high levels of social capital show characteristics of **trust, reciprocity, collective action, information sharing, and participation**.

What is financial capital?

Financial capital is defined as the level, variability, and diversity of income sources and access to other financial resources that contribute to wealth.

Financial capital is the stock of wealth. The most obvious example is **income**, but it also includes other financial resources such as **savings, remittances, investments, safety nets, loans or the ability to use assets to get loans**.

What is natural capital?

Natural capital is defined as the natural resource base, including land productivity and actions to sustain it, as well as water and other resources that sustain livelihoods.

Natural capital is the stock of natural assets which include geology, soil, air, water, and all living things. It is from this natural capital that humans benefit from a wide range of services, often called ecosystem services, which make human life possible.

The most obvious ecosystem services include **the food we eat, the water we drink, and the plant materials we use for fuel, building materials, and medicines**. There are also many less visible ecosystem services such as the role forests play in regulating the climate and protecting us from floods, the carbon stored in peatlands, and the pollination of crops by insects. Even less visible are cultural ecosystem services, such as the inspiration and enjoyment we take from wildlife and the natural environment.

What is human capital?

Human capital is defined as knowledge, education, skills, and health.

A key resource in any system is the people themselves, as there are no economies and no livelihoods without people. Indeed it has been said that 'people are the real wealth of a nation'.

Human capital is the stock of **knowledge, skills, competencies, and attributes** that people have and which they can use to improve their wellbeing. Human capital does not just relate to **formal education and job skills**, and it is not something that is fixed after formal education ends. Instead it includes all the knowledge, skills, and abilities that we gain throughout our lives that we can draw on, and includes our **creativity, health, social skills, leadership skills, and memories**.

What is physical capital?

Physical capital is defined as things produced by economic activity from other capital, such as infrastructure, equipment, improvements in crops, and livestock.

Physical capital is the stock of things produced by economic activity from other capital, such as **infrastructure, equipment, improvements in crops, and livestock**. For example a wooden bridge is constructed by the conversion of natural, human, and financial capitals, and can result in increased social capital. Trees are cut for the wood (*natural capital*), people know how to construct the bridge and provide the labour *(human capital*), money is exchanged for tools, equipment, and materials *(financial capital*), and the bridge (*physical capital*) provides a transport route that allows two previously unconnected communities to connect (*social capital*).

The interaction of the capitals

Considering all 5Cs is important for assessing flood resilience in a project design. Projects often focus on just one or two capitals and do not always consider all the factors that influence success or failure (see box).

For example, **a flood levee project** would consider all the factors relevant to physical capital – the levee itself – but it must also consider other factors, such as:

Social: Has everyone affected by the levee had the opportunity to participate in the decision-making process? Will anyone be excluded from the benefits or negatively affected by the levee? Will the levee negatively impact on any cultural or religious practices or places?

Financial: Have budgets been allocated for maintenance? Has the impact on river-dependent livelihoods been assessed and financial compensation arranged for anyone negatively impacted?

Natural: Has there been an environmental impact assessment of the levee? Do the benefits outweigh the negative environmental consequences? Have actions been taken to limit the negative environmental consequences and ensure natural resources are not damaged or destroyed? What will be the impacts on the community of any disruption to river flow, flooding patterns on productive land, wildlife for pollination and other vital functions, ponds and sources of water for food?

Human: Are there the skills and knowledge locally to maintain the levee? Does the community understand that the levee only protects them up to a certain point? Will anyone be exposed to any health risks from the levee?

Looking across the 5Cs in this way helps a project to achieve the greatest impact and avoid negative unintended consequences.

How do the 5Cs contribute to flood resilience?

Each of the 44 sources of resilience relates to one of the 5Cs, and together they build up a complete picture of all the social, financial, natural, human, and physical factors that influence flood resilience.

Social capital and flood resilience

High social capital is demonstrated through situations of **trust, reciprocity, collective action, information sharing, and participation in local activities and processes of governance**. These characteristics enable people to work together to find solutions for shared problems (such as floods), to help each other in times of crisis, and to have official institutions or authorities that fulfil their responsibilities to citizens. Where these characteristics do not exist, people may behave in ways that increase risks or prevent effective action, either because they do not know how their actions impact on others, or because their own self-interest is their only concern.

Examples of this that you will explore through the sources of resilience S01 to S11 include the following:

- There is a community plan for reducing and managing flood risks.
- The development of the plan was participatory and included lots of different people and perspectives.
- The community feels safe and community relationships remain good, even when there is a flood.

Financial capital and flood resilience

Financial capital can be affected by floods. Cash savings or documents needed to access bank accounts or receive remittances or aid can be destroyed by floods or lost in the process of evacuating. Income generating activities can be disrupted, destroyed or permanently affected. The ability to take loans is also reduced if you have lost assets or if the people or organizations you borrow from have also suffered losses.

But financial capital can also help to build flood resilience. Before a flood occurs, setting up financial protection against flood damage and losses can help the recovery from floods. This could be through insurance, savings, a community social fund, pre-arranging credit in case of disruption or dedicated government relief programmes.

It is important to know that **wealth is not the same as resilience**. Wealthy members of a community can also lose everything in a flood disaster and relying on financial capital alone can make people wrongly believe they do not need strengths in the other capitals.

A challenge every community faces is deciding how much of their financial capital to invest in growing what they already have, and how much to invest in protecting what they already have against future losses from floods that may or may not happen. In situations of poverty this is even more challenging.

Examples of this that you will explore through the sources of resilience F01 to F07 include the following:

- Money has been allocated for risk reduction activities and flood response.
- People have savings, insurance, or other means to pay for damages and losses from floods.
- Households and businesses have planned for how to continue income generation during floods.

One characteristic of being resilient from a financial capital perspective is the ability not to have to resort to negative coping strategies (also called erosive coping strategies or mechanisms). **Negative coping strategies are actions that people take to cope, but that leave them worse off in the future**. Examples include:

- Selling productive assets for immediate cash, which results in reduced income for months or years to come.
- Going without food, which saves food and money immediately, but leads to sickness or low productivity.
- Removing children from school to save money on fees and have extra help at home, which results in lower levels of education and reduces employment and livelihood opportunities for the rest of their lives.
- Engaging in illegal or unsafe activities that generate income now, but result in imprisonment, serious injury, or loss of life, increasing the household burden through legal or healthcare costs and/or loss of a productive adult.

Natural capital and flood resilience

When natural capital is depleted, damaged, or destroyed, communities are exposed to worse impacts from floods and other hazards. For example, without a healthy mangrove the full force of a storm surge reaches a community; without a forest there is no windbreak to protect a community during high winds; and without natural vegetation to bind soil to riverbanks and hillsides when the rain is heavy these are washed away. Natural capital also provides wild foods, water, fuel, and building materials people can fall back on in times of scarcity or crisis.

Human actions – including livelihoods and development projects – can **deplete, damage, or destroy natural capital**, with negative consequences for lives and livelihoods, and for flood resilience. Flood patterns are altered – for good or bad – as a result of human activities such as land use, water use, and building infrastructure.

With financial capital, we understand that if we spend more than we have we will get into debt, and unless we repay this debt we will be bankrupt. Likewise with natural capital, when we take too much from our natural environment we also run up a debt which needs to be paid back, for example by replanting forests or allowing ponds to be refilled with rain after we have taken water. If we keep taking without allowing nature to recover, we run the risk of ecosystem collapse (bankruptcy). To prevent this we must understand the relationship between how we use resources and how they are replenished. We also need to understand what is changing or might change in the future that will disrupt this pattern, such as climate change, population growth, new technologies, or urbanization.

Examples of this that you will explore through the sources of resilience N01 to N05 include the following:

- The local environment is healthy and there is little environmental degradation.
- There is a local land use plan and it is followed.
- Policies are in place to protect the natural environment and to promote habitat restoration.

Human capital and flood resilience

Human capital can be affected by floods through loss of life, injury, water-borne diseases, loss of educational opportunities, and migration, but high levels of human capital can help to reduce flood risks, prepare to save lives and avoid disease during floods, and help to recover quickly after floods.

Education increases people's abilities to access and understand information, problem-solve, and engage in formal processes such as for flood management. With more knowledge and information about risks and risk management strategies, communities are in a better position to reduce the negative consequences of floods.

Good levels of health increase resilience to floods, but can also be destroyed by floods. For example, there may be less food (and less nutritious food) available, health centres may not be functioning, or outbreaks of water-borne diseases may lead to malnutrition, especially in children.

Examples of this that you will explore through the sources of resilience H01 to H09 include the following:

- People are knowledgeable about flood risks.
- Emergency food, water, and health supplies are available to prevent ill-health during floods.
- Children continue to attend school even after a flood.

Physical capital and flood resilience

Physical capital can be an effective contributor to flood resilience; however, if poorly designed, located, or maintained it can make floods and the impacts of flooding worse, and can come at a cost to natural capital.

It is important that infrastructure is designed and built with flood risks in mind, particularly infrastructure for important services such as schools, hospitals, sanitation, clean water supply, roads, emergency shelters, power plants, bridges, and communications systems. Transportation infrastructure is important so that a community does not become cut off from emergency and other services in the event of a flood.

Examples of this that you will explore through the sources of resilience P01 to P12 include the following:

- Houses and community buildings have constructed flood protections.
- Buildings, bridges, and roads are not severely damaged and the community is not cut off during flooding.
- Vital services such as electricity, communications, health, and education services continue to function.

Sources of resilience, resilience outcomes, and data collection methods

Each of the 44 sources of resilience (used at baseline and repeated, known as T-line) and 29 resilience outcomes (used post-flood) ultimately needs to be graded (grading is explained in Section 7).
The information used to grade these comes from the community. Project leaders select the data collection methods for each source of resilience and resilience outcome from those available in FRMC. They do this based on what they find out about the community through initial engagement, the information that is already available, the resources available to work with the community, and the best methods for generating – and checking – different types of information (see Figure 4).

Each method has strengths and weaknesses, so a mixture will be used, but you do not need to use all the methods for every source of resilience or resilience outcome. However, using more than one method for each source of resilience or resilience outcome allows you to check your information and tends to improve quality and confidence at grading. Once the data collection methods are inputted for each source of resilience or resilience outcome, the FRMC automatically generates the questions you need to investigate.

What?	How?	Who?
• Data to measure each source of resilience • Questions for each source to be answered	• Household surveys • Focus group discussions • Key informant interviews • Source data	• Trained and skilled field workers to collect data • Project lead to plan the data collection process and coordinate the efforts

Figure 4 How can we collect data to measure the sources of resilience?

Selecting the right methods

There are four data collection method options in FRMC: **household survey (HH), focus group (FG), key informant interview (KI), and secondary source (SS)**.

The questions that you need to investigate will be generated by FRMC when you select the methods you will use for each source of resilience or resilience outcome; you do not need to write your own questions! But you do need to understand why and how you use each of the methods, so that you can select the best combination of methods for each source of resilience or resilience outcome with your community. The information in Table 1 is provided to help you to understand some of the opportunities and limitations of the different data collection methods, so that you can think through how best to use these, how to train your staff to use these, and which are best suited for different types of information. More information on how to implement quality HH, FG, KI, and SS data collection methods is provided in the section on community engagement (Section 6).

Data collection method	Reasons for their use
Household survey (HH)	For the overview of the whole community and 'numbers of people who…'
Focus group discussion (FG)	For different perspectives and the reasons behind them, the relationships and interconnectivity between things, and '*why* people do…'
Key informant interview (KI)	For specific pieces of expert, technical, or service-related information, or for lived experiences particular to certain people and situations
Secondary source (SS)	For information already collected by other people

Table 1 Suggestions on when and why to use the different data collection methods

Household survey (HH). For the overview of the whole community and 'numbers of people who…'

Why select HH? Household surveys are a good way to collect simple pieces of information from lots of people, which when looked at together gives you an overarching picture of the community as a whole.

How does it do this? Surveys ask the questions generated by FRMC to *all HH participants in a standardized way*. Technical words must be taken out or explained and locally relevant wording of the question agreed and used. The agreed wording must be asked to all respondents in the same way.

Why is this useful? HH gives you numbers of respondents who answered in a certain way. So you can find out things like the percentage of community members with savings, who are trained in first aid, or who are most affected by flooding. HH also enables you to look at how different groups of people answered questions and analyse what that tells you about the situation. For example, do women and men generally give the same answers to questions like: 'If there is a flood and you need

to evacuate, do you know where to go?' 'Are you involved in flood-related activities for your community?' Or 'are flood-related activities inclusive of both men and women and all relevant vulnerable groups?' If they do not, think about what this tells you. Analysis of what the data means – and not just what answers were given – is vital for grading each source of resilience and resilience outcome.

What are the limitations? You can only take information collected at face value as there is no opportunity to find out in detail the reasons participants have answered in the way they have. There is no opportunity to investigate or explain inconsistencies in the data that is collected.

How do you do HH well? The sample size (number of participants) must be big enough and representative enough (across age, gender, status, and location in the community) to give you roughly the same results as if you had been able to ask every single person in the community. That way you can draw conclusions about community resilience as a whole. For example, if your sample is representative of the people in the community and is of a good enough size, you can conclude that if 25 per cent of respondents say they have savings, it would be fair to say probably about 25 per cent of the community has savings. However if you just talk to rich households or poor households, or only a few households, or those who always participate in projects, then this is not a conclusion you can reasonably make.

Focus group discussion (FG). For different perspectives and the reasons behind them, the relationships and interconnectivity between things, and 'why people do…'

Why select FG? Focus group discussions allow you to collect complex information, explore relationships and interactions between things, and understand differences in knowledge and perceptions.

How does it do this? The questions generated by FRMC are used to design participatory activities that you run with different groups to generate the information you need. (Please note: you do not simply sit with a group and ask them the list of FRMC questions. FGs are not questionnaire-based like HH and KI. Section 6 provides FG activity options for FRMC.) In FGs, participants work together on an activity and through that process you gather all the different information that participants hold, as well as understand what differences of opinion there are and why. You use open-ended questions (questions that cannot be answered with a yes or no, but require people to talk about or explain something) to generate discussion throughout the group work, and to probe for more detail.

Why is this useful? You are able to gather very detailed and often complex information very quickly (much more quickly than by interviewing everyone separately), and you can also 'check' the information as you go, by asking if others in the group agree, or if they disagree, why? FGs also bring issues alive more easily and in a more engaging way, and tend to bring to your attention important factors you had not been aware of before. You always learn something surprising in a FG. FGs are also more engaging and enjoyable for the participants, as they have the opportunity to share what they know with others and learn from other members of their own community. It also facilitates reflection on what the group has shared, which is important for ownership of the issues and often much more powerful for changing perceptions and behaviours than presenting findings. For example, if different natural resource users meet and are able to discuss how their different activities affect others, such as through a Hazard Map activity, they can have a dialogue about how they might find some compromise solution to help them both. Person-to-person interaction around the issues is important for building community ownership in the process and building solidarity to work together on shared solutions, and FG is the only data collection method in FRMC that directly contributes to this. Therefore (if done well), FG can have enormous value over-and-above the data collected.

What are the limitations? FGs require very good design, facilitation, and time-management skills. A well trained and well-practised team is needed, with multiple facilitators and note-takers (who are able to document everything every participant says) for different groups (especially for women and men FGs to be done separately with women and men only teams). FG information is not directly entered into the FRMC during the session; instead the team must carefully document all the information then reflect on it together, to be able to answer the questions in the FRMC based on evaluating everything they got from the session.

How do you do FG well? Diverse groups are best for community groups that you organize specifically for a FRMC purpose. With diverse groups you can gather lots of different information and perspectives, so that you can explore the reasons behind the differences. Use an activity to engage the participants and then open-ended questions to probe for more detail. Facilitators should speak very little, but skilfully steer the activity and discussion to get the detailed information needed.

Key informant interview (KI). For specific pieces of expert, technical, or service-related information, or for lived experience particular to certain people and situations

Why select KI? KIs are a good way to get specialist information on something specific.

How does it do this? KIs ask specific questions generated by FRMC to people you have identified with specific knowledge, information, or experience. That person is asked a number of questions through an in-depth interview. Unlike HH, the questions can be elaborated upon to gather further details or for the interviewer to clarify their understanding; however, the interviewer must not put 'words into their mouth', rather ask them to clarify or add to what they have already said.

Why is this useful? It can give you information that is not known by everyone, such as specifics of policies, rules, services and how they function, particular activities and how they are managed or funded, or the perspectives of people in power or with certain responsibilities. It can also be used to find out about particular experiences some individuals have had, that are not common to all community members.

What are the limitations? You often do not have a way to verify this information, and sometimes experts can be wrong, or how the information is interpreted and recorded can be wrong. Also KI perspectives must not be confused with *facts*. Even experts' opinions are not always correct, or they may not have access to all the information to see the complete picture. For example a planning officer may say a new structure has not increased flooding. They may say this because there was a study done to look at this, and the study concluded that it would not. However if local residents say it has increased flooding because they are experiencing the flooding, then that 'lived' experience is more accurate than the expert opinion.

How do you do KI well? Select participants with particular information, knowledge, or experiences. The framework allows you to set up multiple questionnaires for different KIs. This allows you to target the KI to gather the knowledge most useful for the framework. Hence you could ask a local NGO project manager who has been delivering first aid training in the community for the last 10 years, how many people in the community have been trained in first aid (H02); but you would not ask them what percentage of girl school students would miss school or classes for at least a week if there was flooding (H03), because they have no specific knowledge of that, instead you would set up a separate KI questionnaire for a the village teacher to answer this question. By using multiple KI questionnaires you are able to target the right questions matched to the right KI.

Secondary source (SS). For information already collected by other people

Why select SS? SS is a good way to use information you know has already been collected by other people or processes, such as census information or a recent vulnerability and capacity analysis undertaken by your organization. SS can also be used to collect information on things outside the control or knowledge of community members, such as national policies or weather data.

How does it do this? Research as much as you can through online information and local sources of information. Ask officials, staff, partners, and community members to tell you about sources of information they know about.

Why is this useful? It can save you a considerable amount of time and money if similar surveys and analysis have already been undertaken by a trustworthy source. It can also allow you to check information that you have collected, to give you more confidence in it or to highlight where information may not be correct or need further investigation.

What are the limitations? Even published studies can be wrong or of poor quality, and even when information is widely cited it could have originated from a poor quality source. In this way inaccuracies and misinformation can become reinforced. Only use sources if you are confident they are of good quality and sources that are recent enough for the information to still be correct.

How do you do SS well? Use sources you already know about and trust, and sources recommended to you by people you trust. Always verify where the information originally came from. For example a newspaper article may be a useful source of information, but if the evidence it talks about comes from a published report, read the original published report, do not simply take at face value how a journalist has written up the report findings.

Finalizing the data collection methods

You need to begin working with the community before you finalize the study design (guidance is provided on this in the Section 6). By this we mean input the data collection methods you will use for each source of resilience into the FRMC. This is because you need to understand who and what are in the community, and the flood risks they face, to be able to select appropriate data collection methods and participants for that community. Data collection methods will be different from community to community. By starting to work with the community in the ways described below, you will be better able to select those sources of resilience or resilience outcomes for which you can make best use of HH surveys and what sample size is needed; FG activities and with what groups of participants; and KIs and with whom. You will also start to gather some data for FRMC too, so *it is a valuable first step to both collect some information and increase your knowledge, which will improve the quality of the data you collect later.* Do not finalize the methods before you start this work with the community as you cannot change the data collection methods in the FRMC after they have been inputted.

Things to consider when selecting methods:

- **Participant's time.** What is a reasonable amount of time to ask someone to participate for free in a household survey, focus group, or interview? (Recommended 30–60 minutes for HH, 10–60 minutes for KI, and 1–2.5 hours for FG.) This will factor into your methods selection; for example if you selected HH method for every source of resilience it would take several hours to complete.
- **Staff time and resources.** What are the resource implications of your choices? Do you have enough staff or budget to hire and train enough enumerators, as well as time, to conduct all the HH, FG, and KI in the community?
- **Existing information.** Use what existing information is available if it comes from a reliable source and is up to date. For example, if your organization just facilitated the development of a community flood management plan, then you do not need to ask whether such a plan exists – you already have it! However if this was done 8 years ago, then you need to find out if it has been updated.
- **Reliability of information.** Information is more reliable if it comes from more than one method. If information comes from only one place you have no way of checking if there has been a mistake, misunderstanding, or if it is something that is different for different people. Therefore in most cases more than one method is needed. Shared learning from FRMC has shown that assessors were more confident in their grading process when they had more information from different methods.
- **Facts and perspectives.** Factual information is more reliable from people who know, and perspectives are more reliable if they come from people themselves. For example, members of a community flood management committee are a good source to find out if the community has a formal flood management plan. But they are a poor source to find out whether the plan is well known and understood by other members of the community, and everyone follows it. Likewise the police are a good source on local safety and security facts and figures, but to find out if women feel safe, then you must ask women themselves. For something factual then one source who 'knows' may be sufficient, but for other factors a variety of perspectives will need to be collected, and the different perspective weighed up to score the source of resilience.
- **Inclusion and marginalization.** Everyone in a community is not the same. Just think about you and the people in your community: do you all have the same situation in life? Just as flood resilience is different from place to place; it is also different from person to person for the same reasons. FRMC seeks to assess the general picture for the whole community, but everyone using the framework must understand that *different people are affected differently – so there are no right or wrong answers that we are seeking to collect – instead we are trying to gather the variety of views across the whole community.* After selecting the methods and who to talk to for each source of resilience or resilience outcome, take a step back and think about the whole picture. Ask yourself, is anyone missing?
- **Targeted data collection.** Use the different methods to get different pieces of information in a targeted way (to save time and money, and produce the best results). Do not try to cover everything in every HH, FG, or KI. For example do not use the same questionnaire for every KI, tailor each to the person and what information they can reliably provide. For some this might just be a few questions taking only 10 minutes, whereas for others it may be more in-depth and take an hour. HH are standardized across the community, but FGs and KIs must be tailored to specific information needs.
- **Disaggregated information.** Make sure that the different perspectives are included in the data collection design, considering gender, age, disability, and other diversity factors. Record this information for every HH, FG, and KI participant, so that results can be analysed by these factors (for example you can compare the responses to a HH question by all participants, just the men, just people over 55 years of age, or just people with a disability).

Lessons learned from previous FRMC use

Assessing the pros and cons of the different data collection methods to select the right combination for each source of resilience or resilience outcome in your context is very important. However, FRMC has now been implemented in over 120 communities so there is some learning and recommendations that can help you in your selection process and to get the most out of your resources and time spent with the community.

- Many previous FRMCs overly relied on HH (and therefore predominately quantitative data) because they lacked established relationships with the community to be able to convene FGs, and know who to speak with (KIs), and what sources of information were available (SS). HH does not provide the qualitative data needed for a well-rounded understanding of a community and their flood resilience, so efforts must be made to set up the partnership with the community in advance.
- Because of this over-reliance on HH at baseline, many FRMCs used different data collection methods for their baseline and endline (using mainly HH at baseline, then more KI and SS later). Best practice requires us to use the same (or at least very similar) data collection methods for baseline and endline, to ensure it is a fair comparison.
- Resources must therefore be considered from the start. Many FRMCs involved considerably more data collection at baseline than at endline, which can significantly skew results. As above, the endline (or repeated T-lines) should be as similar as possible to T0 in methods, scope, and volume.
- Learning and feedback from users has also indicated that **at least two data collection methods** must to be applied for each source of resilience or resilience outcome for effective grading.
- The grading process for **social capital** sources of resilience is complex and requires a good understanding of the institutional and social networks in a community. Combining FG and KI is very important as a minimum for understanding social capital.
- **Financial capital** sources of resilience are particularly well measured through a combination of HH and KI.
- **Natural capital** requires a broad understanding about the local environment and the broader geographic and policy landscape. FG and SS are very good sources to use for natural capital sources of resilience, with some additional KI to cross-check particularly the SS information.
- **Human capital** sources of resilience were most confidently graded when information was collected through a combination of HH *and* FG, and in some cases cross-checked with KI.
- Information on **physical capital** is often best collected through FG *and* KI, which when combined draw together a picture of the accessibility and functionality of the community's physical capital.
- The '**rational box**' in FRMC has been found to be a useful tool for communicating the findings and underlying drivers.

Information you need before you start

Gather what you can before going to the community

To start, look at what is already known about the community. Use information available from project staff, project documents, reports, maps, and any other sources available to you.

Things to find out about the community before you start

1. **Where is it located in the landscape?** Find it on a map. What water bodies are nearby that might influence flood hazards, such as streams, rivers, coast, swamps, ice-caps, lakes, and reservoirs? What other important features are nearby that might influence flood risks, such as mountains, valleys, roads, dams, forests, or large factories? Is the community in an urban or rural area?
2. **Who lives there?** How many people live there? What are the key livelihood activities? What are the levels of wealth and poverty?
3. **What institutions are there?** Are there schools, hospitals, banks, other NGO projects, factories?
4. **What are the governance arrangements?** What jurisdiction is the community in? How are community activities managed? Who provides key services?

Starting working with the community

You will need to start working with the community before you finalize your selection of the data collection methods for each source of resilience. The initial activities with the community will enable you to answer the 'community context questions'[10] in the framework, as well as understand which data collection methods you will use and with whom, to gather the information needed. Initial activities are needed to do the following:

- **Build a relationship with the community.** You need to do this to establish access with officials and community leaders, and so that community members understand what will happen and what you will do with the information they give. This is vital to be able to find out about SS, KI, and FG (interest groups) options and establish the contacts to be able to arrange these later.
- **Find out about the main flood hazards.** You need to understand this to focus your time and resources towards gathering the most relevant information for the flood hazard.
- **Find out who lives in the community.** You need to understand this to design a representative sample for the HH and to identify who to include in FG and KIs.
- **Find out what institutions and services are in the community.** You need to understand this to know who to speak to for KIs.

Information you collect now through these FG and KIs with the community can be included in the FRMC recorded data (you do not need to repeat activities already undertaken and data collected, unless it needs improvement or more detail or perspectives added). However the information collected here is most important for helping you to finalize the best data collection methods and select participants for the main data collection process. At this time you should not input any data into the FRMC, just document the information you have for now.

10 Community context questions are information on the community that you need to gather and input into the FRMC. More information on these can be found in the FRMC User Guide, Section 5.3 Community context questions, http://repo.floodalliance.net/jspui/bitstream/44111/2859/1/FRMC%20User%20Guide.pdf

Table 2 outlines different options that are recommended for gathering the initial information needed for the community context questions and to help you select the data collection methods.

Objective	Options for KIs	Options for FGs
Build a relationship with the community	Community leader Community council member	Community meeting
Find out about the main flood hazards	Community leader Community council member Civil protection leader	Community map and flood hazard map Transect or flood path walk
Find out who lives in the community	Community leader Community council member	Social map Community map
Find out what institutions and services are in the community	Community leader Community council member	Community meeting Institutional Venn diagram

Table 2 Different methods to better understand the community context

What do I need to know about the main flood hazards?

You need to know the **main sources and areas of flooding**. The same community can experience different types of flooding and you need to collect information about **each type and area of flooding**. For each find out about:

- **Hazard.** What type of flood process is it? (For example, from the sea, a river, lake, reservoir, glacier, or dam/reservoir release, or from heavy rain on higher ground or causing standing water?) When does it happen (every year at the same time such as monsoon season, after heavy rain, at high tide, when there is an extreme storm)?
- **Exposure.** Where does the flooding occur in the community – this can be separate places even for the same hazard. What is exposed to that flooding? (What is located in the area where the flooding can occur, are any homes located there, or farmland, infrastructure, livestock, domestic water sources, transport routes)?
- **Vulnerability.** Who does each flood affect (whose assets and resources are exposed)? How severely are those assets and resources impacted by the flooding?

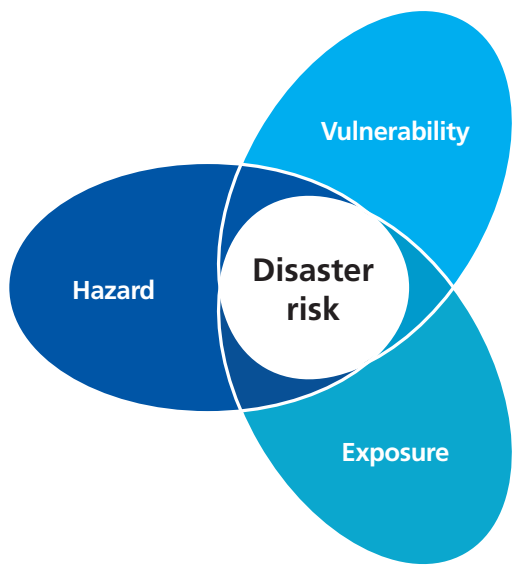


Figure 5 The IPCC AR5 core conceptual framework with risk at the centre

This gives you a strong starting point from which to ensure that through the data collection methods you select, you gather all the detail you need on the **flood risks**, and also find out about the **factors influencing the hazard**, and the **impacts and consequences of flooding** (see Figure 5).

Recommendation:[11] A community and flood hazard mapping activity is a very good place to start. Through this FG activity you will get to see where on the map flooding occurs, what areas are impacted by the flooding, and who/what is in those areas. Additionally, a transect or flood path walk is useful to be able to see the areas for yourself. Think back to what you know about the location of the community (what you have learned from maps and other sources of information) and reflect on what factors outside the community may be contributing to these hazards, and how to collect data on these.

What do I need to know about who lives in the community?

You need to know **who lives in the community**, including:

- population or household numbers;
- poverty status (percentage of households living in poverty);
- factors that might make people more vulnerable or excluded from the process (such as disability, ethnicity, level of education, gender, female-headed households, religion, language spoken);
- major livelihood activities;
- any different zones within the community (for example, all the farmers live in one area and all the pastoralists in another, or those living in poverty live in a slum area and the wealthy in a different area).

Finding out about this will mean you are able to do the following:

- **Select participants for HH surveys that together reflect the community as a whole.** For example, if the community is 60 per cent women then 60 per cent of HH participants should be women; if 12 per cent of households are female-headed then 12 per cent of HH surveys should be; if 20 per cent of the community are pastoralists then 20 per cent of HH participants should be also.
- **Understand all the different perspectives you will need to gather on different issues (particularly issues related to how different people, resources, and activities interact), design FG activities, and select the right mix of participants for them.** For example, for discussions of land and water resource use, domestic, productive, and commercial uses must be considered; likewise with land use, perspectives from all the land-based and natural resource-based livelihoods must be gathered.
- **Understand constraints you need to plan around.** For example, do not do data collection during times of harvest, seasonal outmigration, annual flooding or religious festivals. Consider the times of day that different participants would be available and places that will be convenient. What impact might the place have on participation? For example, if a religious building is selected, will people of another religion come? Are some places not accessible or comfortable for certain people, such as pregnant women, nursing mothers, or disabled people? Does transport need to be provided for community members living on the edges of the community or do FGs need to be repeated in different locations to encourage participation of all parts of the community?

Recommendation:[12] Community officials are a good source of demographic information, such as number of households, age ranges, major livelihood activities, ethnic and religious make up. A social map activity is a really good way to find out more details on this, especially where different groups of people live and who are most socially and geographically marginalized. Compare what you

11 Further information on the FG activities recommended in this section can be found in the section 'Working with the community'.
12 Further information on the FG activities recommended in this section can be found in the section 'Working with the community'.

have learned about what parts of the community are affected by flooding and what parts of the community have social problems or are marginalized, and reflect on the implications of this for flood resilience and for selecting methods and participants for data collection.

What do I need to know about what institutions and services are in the community?

You will need to know **what institutions and services** exist in the community, and **which ones are particularly exposed to flood hazards**. This will enable you to focus on gathering detailed information on those institutions and services, such as selecting KIs with people responsible for them such as a clinic manager, head teacher, or waste management supervisor.

Finding out about this will mean you are able to do the following:

1. **Generate a list of all the institutions and services people rely on** and whether they are located inside or outside of the community (these can be schools, clinics, hospitals, waste disposal services, banks, savings groups, piped water, mobile telephone mast, electricity supply).
2. Compare where these are located with flood-affected areas of the community.
3. *Select KIs to gather information for every flood-affected institution or service*, and know whether these will be done in the community or require visits to other places (or telephone or Skype KIs).

Recommendation:[13] A list of institutions and services could be compiled through discussion with the community leader and/or as part of the community meeting. A community FG activity such as an institutional Venn diagram can provide much more detailed information and is especially useful if done alongside a community and hazard map activity so that information on the impacts of different flood hazards on different institutions and services can be captured.

Note: For all these areas you will have started compiling information you already have. These activities will help you to 'check' the information you have and add to it.

Therefore consider the following:

- Where you can save time and effort. For example if community maps and hazard maps have already been produced, bring them along and use them as visual aids. In such cases you do not need to ask the FG to produce a community map; instead ask someone to talk through what is already there and ask the group to reflect on whether it is accurate, has anything been missed, and has anything changed since the map(s) were drawn?
- Where you need clarification. For example if you have been told there is a bank in the community but this is not on any community map or institutional list, ask whether people have access to banking services or how they bank. It may be that a representative from a bank comes once a week to the community office rather than there being a physical bank. These distinctions are important to understand as you will not need to find out if a physical bank building is affected by flooding, but you do need to find out if the bank representative is ever prevented from coming because of flooding, and what the impact of this is for community members.
- Where there are differences of opinion. For example between community officials and community members on the community boundary. It is not necessary to agree that one is right and one is wrong; you just need to be aware these differences exist, and make sure you collect data on all flood risks that affect the capitals of community members, whether inside or out.

13 Further information on the FG activities recommended in this section can be found in the section 'Working with the community'.

What is a community?

You may have been defining the community as the administrative unit (how it is governed) or how it appears on a map, but once you start working with the community it is important to understand what community members themselves understand to be the space occupied by their community and what it encompasses. This could be associated with physical features and geography, administrative or governance structures, or through social or kinship bonds that define who and what is part of their community. Community mapping and social mapping activities are really good at this stage to help you learn about:

- What resources, land areas, and water bodies the community relies on and considers to be part of their community (the boundary for their **natural capital**) and to clarify if there are any shared resources; for example communities around a lake may share the lake or they may split the lake up into areas that belong to each community.
- Who the community considers they are bonded with as a community (the boundary for their **social capital**).

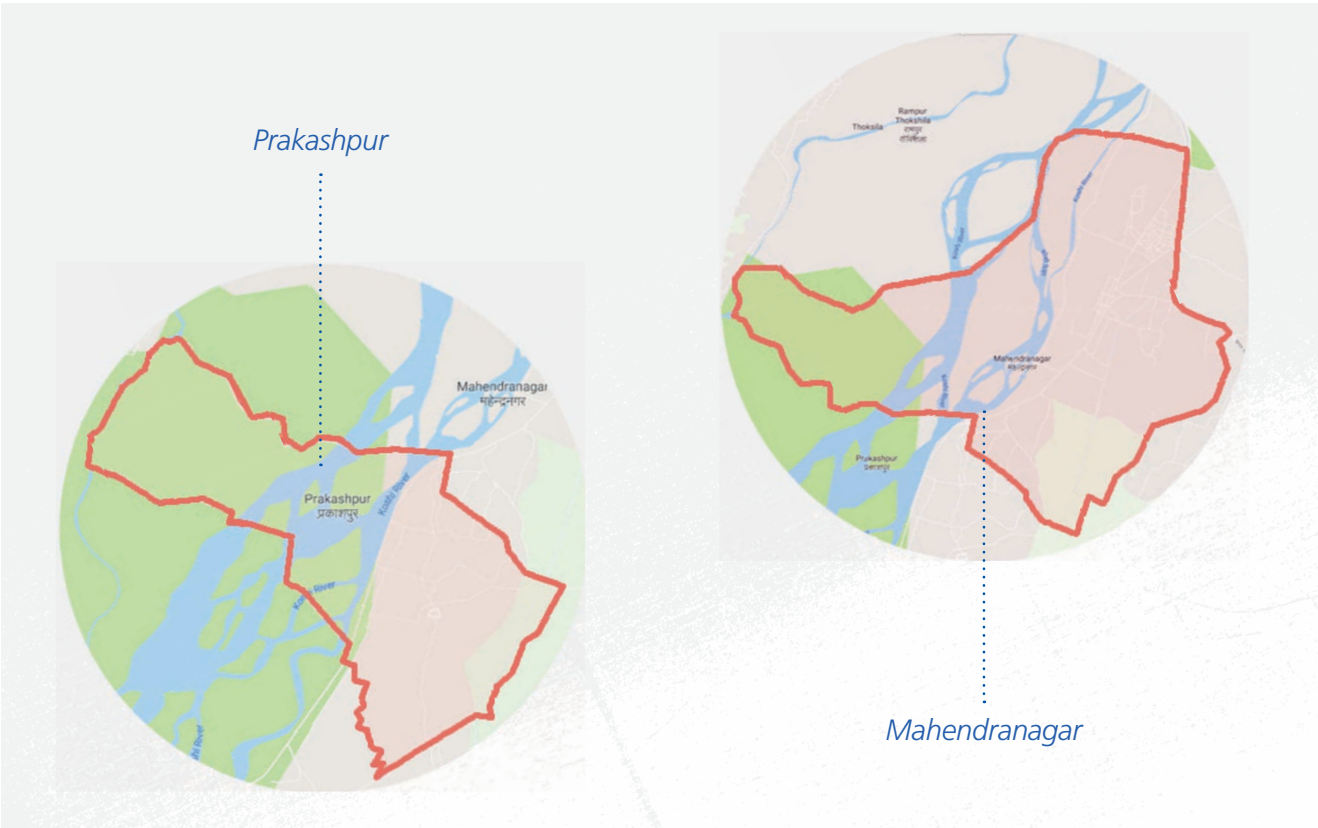


Figure 6 Examples of community boundaries in different physical landscapes

For example an administrative community boundary could be around a settlement on one side of a river, but the fields and forests the community relies on could extend far over on the other side of the river (see Figure 6). Therefore community members may consider that their community includes areas on both sides of the river, even if this is not the official designation by the local authorities.

Putting it all together

Once you know about the community and the information you already have, you can go through the framework and decide the following:

- What questions can be answered/what sources of resilience can be completed, with good quality and up-to-date information you already have, and what do you still need to collect?
- What are the best data collection methods in this particular community and with the resources you have, to collect all the information you need?
- What issues do you particularly need to focus on, related to what you already know about the flood profile and learning from previous flood events?
- Are there any additional locally specific questions you also want to ask to help with your project?[14]

Building the evidence

You will see that you are generating information about the community throughout the application of the FRMC, not just during the main data collection process. It might seem at first glance that there is some repetition, but the point is to build up the evidence as you progress with your engagement with the community so that the most resource intensive data collection activities are really targeted towards the detailed information you need, and you do not waste time gathering information on things you already know about.

Therefore it is recommended you approach data collection in the following way:

1. Start with information you already have about the community – there will be plenty here as the community has already been selected for this project. Compile what information you already have on the community context questions and sources of resilience. Highlight questions you have at this stage and areas you think you will need to focus on. Then start researching secondary sources (SS) and add to the information you have already collected.
2. Next, start working with the community. Use this real life interaction to 'check in' with what you thought you already knew about the community – what holds true and what is different now that you have started talking to real people and seeing the landscape? What needs to be changed in the information you have already compiled on the community context questions and sources of resilience? What new information can you add?
3. Finally, use what you have gathered from the SS and community work so far to identify the remaining information gaps and select the best combination of data collection methods and participants to complete all the information needed across all the community context questions and sources of resilience. Input the complete set of data collection methods selected into the FRMC.

14 Where a FRMC community is also a project community, it is a very good idea to combine resources and activities into one process with the community. For example if you plan to do a baseline household survey, do one household survey that combines what you need for the FRMC and the project baseline. Likewise, if the project involves community mapping and other focus group activities, design and deliver them together to gather all the information you need for the project and FRMC. This is better for your relationship with the community, as you are not constantly asking people to give you their time for things that look to them to be very similar, and is also better for your organization, as it will save you time and money.

Working with the community

Why community engagement and participatory methods?

We use participatory methods with communities to generate accurate and location-specific information, building the unique picture of flood resilience for each community. Participatory methods are also valuable because they are *more empowering for local people than other methods*. This is because they involve the members of the community in the information generation process – and seek to make it their process – rather than data collection being extractive and controlled by 'outsiders' with no meaning or value for the community.

But participatory methods are only empowering and a positive experience for the community if they are used and implemented well, and if having *an empowering and positive experience is an explicit goal of the FRMC implementation team*. For each HH, FG, and KI ask yourself: would I want to participate in this if strangers came to my community? How does this help the participant or is it interesting for them?

Just as this guide helps the FRMC team to understand what influences community flood resilience, through the process of FRMC the community should come to understand what influences their flood resilience. The goal is that by the end of the process the community is empowered to improve their flood resilience, as well as having information generated that can be used by organizations or initiatives to improve planning and investment decisions.

FRMC is not a process of writing a report; it is a process of working with a community to explore the different factors that impact on their flood resilience, and what influences those factors.

How to make the process empowering for the participants

Put participants first

Be respectful and grateful for the time and perspectives of every single participant. After all, participants are giving their time for free and have many other family and income-generating tasks they could be attending to. So give them your full attention, listen well, do not wander off, have your mobile phone on silent, and do not take or make any calls. Never waste the time of participants by being late or only starting to get organized after everyone arrives. Arrive early, be well-practised and prepared. Schedule all activities for times, days, and locations that are convenient for the participants. Avoid times when people have key livelihood, domestic, cultural, or religious activities. Note that this will be different for different participants. Ensure that all participants are informed of all the details in advance (time, location, duration, what will be provided or that nothing will be provided, such as snacks) so they can choose to participate or not. Reconfirm all details at the start and ensure people feel comfortable to leave if the arrangements are not what they were expecting.

Build trust

Make sure you are introduced to the community by someone the community trusts. Always introduce every member of the team and explain the process and how information will be used and made anonymous (not recognizable as coming from them). This is important because sometimes participants feel they have to tell you what they think other people (officials, project staff, members of their family) would want them to say, but that might not be their true opinion. Therefore reassure all participants that no one else will be told what they say and that you really do want to know what they think, whether that could be perceived as positive or negative.

Give participants plenty of opportunities to ask any questions or raise any concerns. Also be aware of how you will be perceived by the community. Some factors you can do something about (like how you dress, speak, or behave), and some you cannot (such as perceived social status, gender, or political affiliation). Take what actions you can to be as neutral as possible and factor into the analysis how the perception of the team or certain individuals in the team may have influenced the information collected.

Manage how you influence the information

Think about which team members should lead which activities based on who different participants will respond well to and feel most comfortable talking honestly with (this may not be the most senior or experienced members of the team). For example, someone who is clearly a technical specialist or has high status may be intimidating to some participants, as they may feel that the person knows more than them. As a result, you may not be able to collect the detailed, location-specific information you need if participants assume you already know more than them.

Another example is using women to engage women participants (women interviewers for HH with women and having women-only FG facilitated by women). Women's perspectives are often overlooked as men-led analysis tends to focus on dominant livelihoods and processes led by men. However, factors that women may know more about are just as important for flood resilience and while men may say they know about these things, if women are dealing with it day-to-day they are the reliable source of information. This could be information about how domestic water is used, supplied, and affected during different types of floods, or food grown for the family to eat, or use of local natural resources for household fuel. It can also be information related to physical safety of, and ease of evacuating, children, women, and people who women might be caring for at home (those who are sick, elderly, or disabled), as well as different perceptions of risk. For example, will women feel comfortable talking about domestic violence, their treatment by men in positions of power, and their sense of safety as a woman in the community, with men they do not know from outside the community? This is information that you can only collect from women, but that women may not feel comfortable sharing with strangers. So you must consider how to create the conditions needed to discuss these things honestly and openly. You will need to have an equal number of women and men in the team, and women carry out HHs and FGs with women, and men with men.

Behave professionally

Train, plan, and practise together as a team prior to going to the community so that you can professionally run all HH, FG, and KIs. Ensure every member of the team is clear on their role and on what information is being collected, how, and why. Ensure that HH, FG, and KIs are kept to the time allocated and do not take too long.

Speak their language

Talk with the community in their own language (using translators if necessary) and only use everyday words that everyone will understand, not technical or academic terms that might confuse people or make them feel they are not educated enough to participate. Plan in advance how you will explain anything technical and ensure the whole team uses the same explanations. Use the help provided to you by the FRMC and the FRMC training process including online and offline documents.

Be inclusive

Consider factors that might prevent some people from participating in HH and FGs. Take actions to include them, such as picking locations people can access, times different people can attend, or repeating a FG activity with community members who would feel marginalized or uncomfortable to participate in a wider FG. Ensure you speak with a diverse range of participants, representative of all types of people in the community. Consider age, gender, ethnicity, disability, livelihood, religion, wealth status, and education level.

Understand bias and influence

Sometimes the information people provide is not correct and it is the job of the team to create the conditions under which participants will be the most honest. Some participants might say things are better than they actually are. Some reasons for this could be that they want to impress you, they want you to think they have a good home and community, they have benefited from the project and want to show they are a good participant, they like the project staff and do not want to say anything negative in case the staff get into trouble, or in places where authorities are not trusted they may fear negative consequences if they say anything negative. On the other hand, some participants might present the idea that things are worse than they actually are. Some reasons for this could be they think the project or community will get more money from the NGO if things are bad, or they did not benefit from the project directly even though others did and they want to be included next time, or they have a political dispute with community leaders. It is important to understand what factors might influence participants and find ways to reassure them and to create the conditions that naturally facilitate the most honest and open participation. Bias is not necessarily about being wrong or lying, it could be about over-confidence in their knowledge and not realizing what gaps they may have in their knowledge. It may also be a result of cultural factors and be determined by norms associated with what people of different status or gender would or would not find appropriate to say to a stranger. Never make accusations that people are being biased; simply listen and record the information. However, note down factors you feel may influence the quality or validity of that information in the notes box and think through what else you could do to check the information or gather other perspectives, so that when all the information is taken together it gives you a truer picture of things.

Household survey (HH)

The sample for the household survey must be representative of the community as a whole. This means selecting enough participants to be sure that when all the information is combined it provides a fair picture of the whole community. It also means selecting enough participants that are women, men, elderly, youth, members of the different ethnic groups, members from different wealth groups, members engaged in different livelihoods, people who are marginalized, and people from different geographic areas of the community so that you get the diversity of perspectives reflecting the diversity of the community members.

Ensure household surveys are *representative*.

Focus group discussion (FG)

Unlike the HH which is repeated exactly the same with all participants, a number of *different* FGs are needed, some will be repeated with different groups, and some will only be done once with specific participants. FGs are primarily used to *explore the different perspectives of ordinary community members* (these are community FGs which you will need to select participants for), though for some it might be useful to use existing committees or groups (interest FGs). Community FGs should not include community leaders, experts, or people in positions of power, because ordinary community members might feel they should defer to that person, or that they do not have anything valuable to contribute because they are not as important. The purpose is to gather information and reflections on the 'lived' experience, not technical or official answers. Importantly these might be different. For example, officials might say women and men are treated the same because there is a gender equality law. But the community members might say there is this law but men and women have different experiences of accessing loans, getting support from government services, or participating in community decision-making. *Community FGs are great for unpacking the reasons behind conflicting information and it is in the discussion among ordinary people of these differences that you often get the most important information and insights.* Separate focus groups should be run for women and men to learn about gender differentiated factors and to ensure that women feel comfortable to participate fully, otherwise certain issues are often missed. Examples include differences between water, land, and fuel access and use for domestic and productive uses, and different factors that make some people more vulnerable – for example instances where women are at increased risk of violence when water sources are contaminated after floods. Remember there are no right or wrong answers; you must look across the range of experiences and answers from different people to be able to grade each source of resilience for the community as a whole.

Getting a FG right takes good training, planning, and a lot of practice – but this investment is needed to get the quality of data required. Common problems are that FGs are dominated by one or two individuals, so you need to plan in advance how to prevent this from happening and deal with it if it does, and how to facilitate in a way that ensures everyone speaks and shares their views. Careful planning (getting the right mix of participants, where to host to put everyone at ease, who facilitates and how), awareness of issues of power and exclusion, as well as good facilitation skills to keep all participants engaged and confident to input are required to generate the high quality data needed.

Ensure community focus groups are inclusive and enable a lot of different experiences and perspectives to be heard and discussed. No individual or group should dominate FG data collection.

Focus groups (FG) with interest groups

FGs with existing committees or groups can be useful to get details on very specific issues that might not be important for all members of the community, or that a group handles on behalf of the community. Examples include a community productive users group, a civil protection group, a community planning committee, a business group, a women's group, or youth group. These FGs should be shorter and specifically designed for this group. Do not use one established group to gather all FG data as these members will have particular shared perspectives.

Ensure interest focus groups have *specific* user knowledge (not technical, expert, official).

Key informant interview (KI)

KIs provide an opportunity to get specific information from individuals with specific knowledge, experience, or expertise. The FRMC allows different questionnaires for different people, so you will have a number of different KIs, but only ask them the KI questions directly relevant to them (some KIs can be very short). Village leaders are important KIs for overview and clarifying issues. KIs include:

Officials with specific responsibilities,for example local town planning officer, head teacher at the school, health centre manager, watershed management directorate, district leader responsible for training and resourcing village flood preparedness committees, or representative from the ministry for disaster management.

Experts with specific knowledge or resources, for example, a researcher who has done a GIS mapping, a local NGO implementing a project in the community, an agronomist trialling new techniques in the area.

Individuals with specific experiences, for example, a person injured in the last flood, a person with a disability that prevents them from accessing local services, a person from a marginalized group unable to participate in the community FGs.

Ensure key informants have specific technical, expert, or official information, tailor your questionnaires to ask the questions relevant to them.

Secondary source (SS)

We don't have to collect all the information ourselves; we can use other sources – as long as they are reliable, recent, and from a reputable source – such as publications, research, project baselines, flood monitoring information, newspaper reports, or any other available source of information. We can also use information our own organization, or another organization has collected in the past such as reports from a vulnerability-capacity assessment, consultant report, or previous project data (so long as these are not considered out of date). It is a good idea to ask all KIs if they can give you or direct you towards secondary sources of information they would recommend, as they are likely to know about specialist information available and how to access it.

Ensure secondary sources have robust, reliable, *specific* information.

Table 3 How to set up each data collection method

Focus Group activity options

The following pages show you eight example activities that you can use in FGs to generate the information you need. For each activity it tells you what you will learn about through the activity and how this specifically relates to the questions for the different capitals.

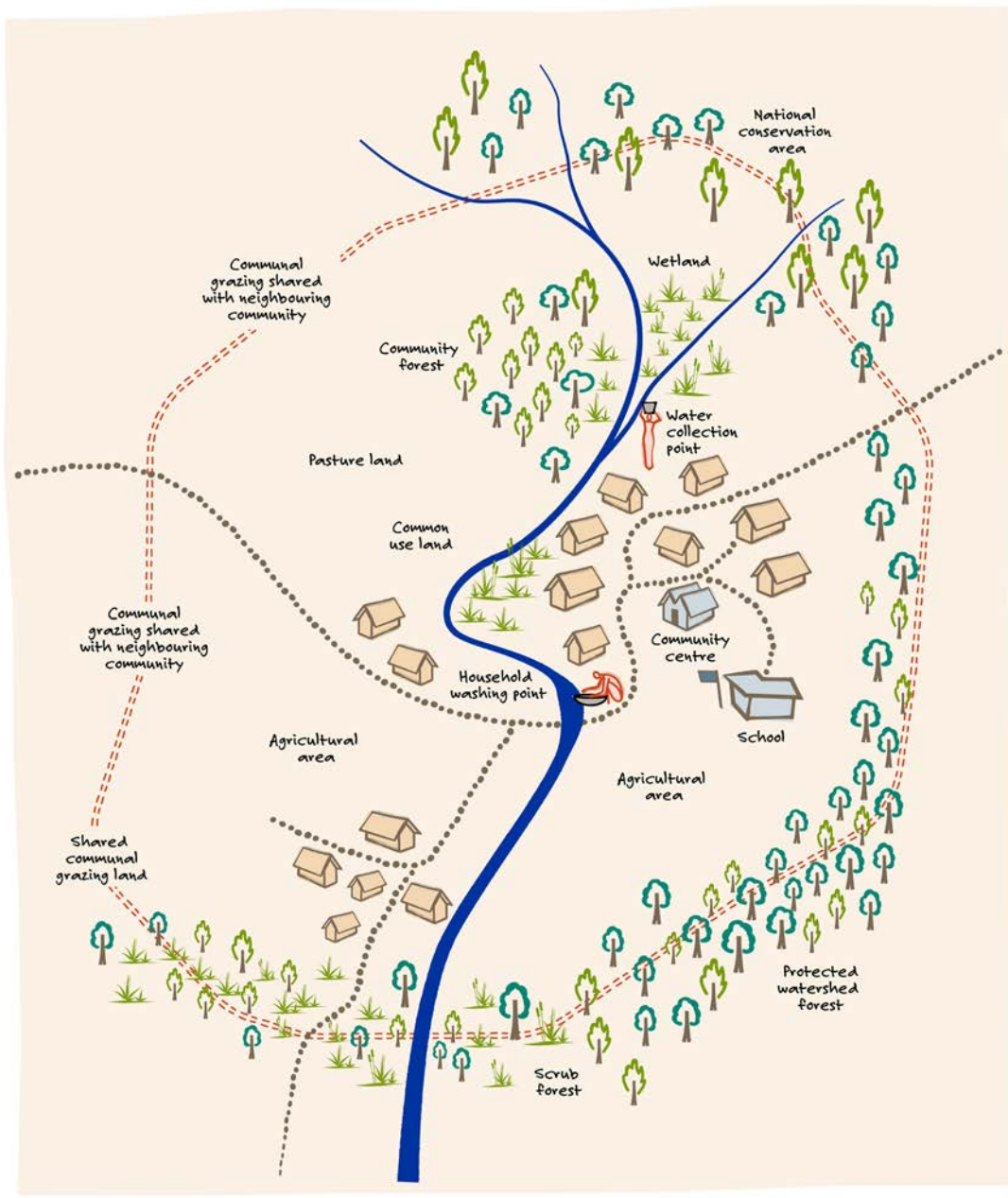
Activity 1

Community map

- ✓ To learn about the physical and natural features of the community, and the landscape in which it is located
- ✓ To define the boundary of the community
- ✓ To identify the main natural and managed resources

Information it will generate

- Community context
- Resource units (NC)
- Infrastructure and institutions (PC and SC)



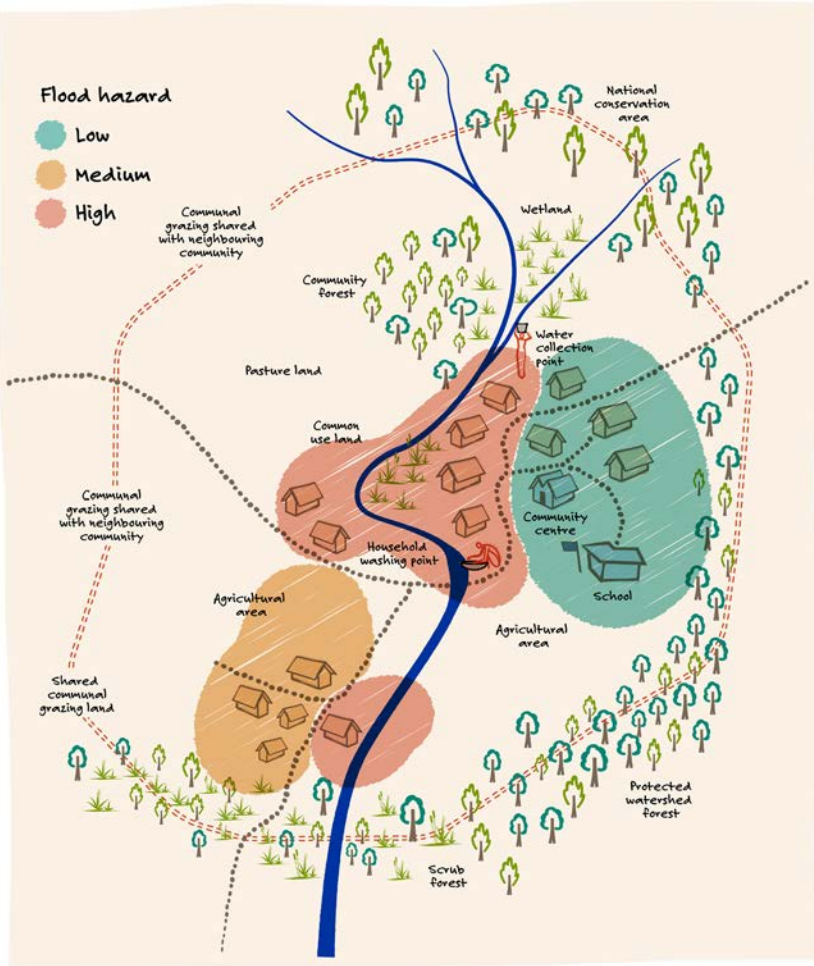
Activity 2

Flood hazard map

- ✓ To identify the flood hazards that affect the community and where they occur
- ✓ To learn about how people manage each type of flood
- ✓ Identify who/what is most affected by flooding

Information it will generate

- Community context
- Flood context
- Knowledge of floods (HC)
- Role of NC and PC in floods
- Vulnerability identification



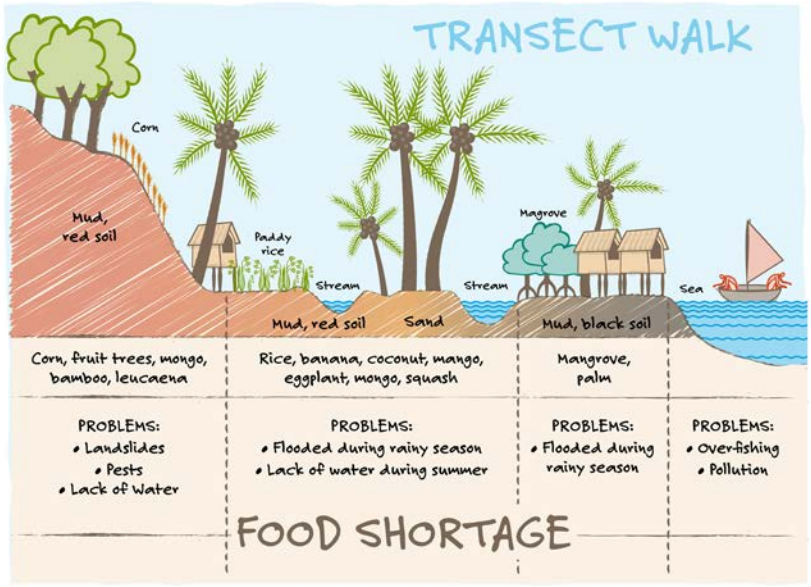
Activity 3

Transect walk or flood path walk

- ✓ To see flood relevant features of the community (to see for yourself after community and hazard map)
- ✓ Learn about the path of flooding, from source to furthest impacts

Information it will generate

- Community questions
- Flood context
- Resource units (NC)
- Infrastructure and institutions (PC)



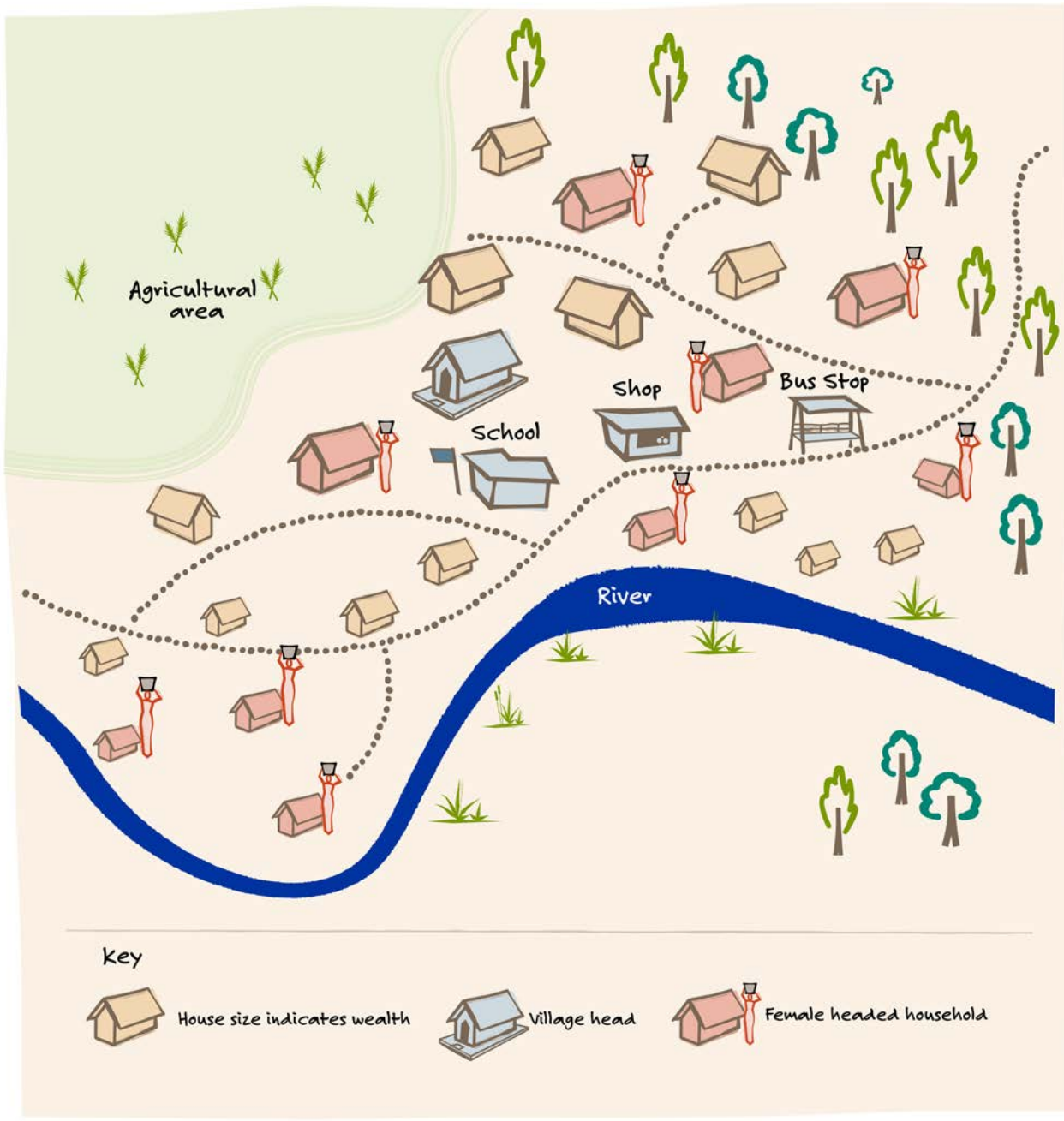
Activity 4

Social map

- ✓ To learn about where people's homes are
- ✓ To learn about who lives in the community (factors like household size, number of households, wealth of households, number of people with disabilities, number of female-headed households)
- ✓ Identify who is marginalized in the community

Information it will generate

- Community questions
- Location of settlements (PC)
- Identify who is marginalized



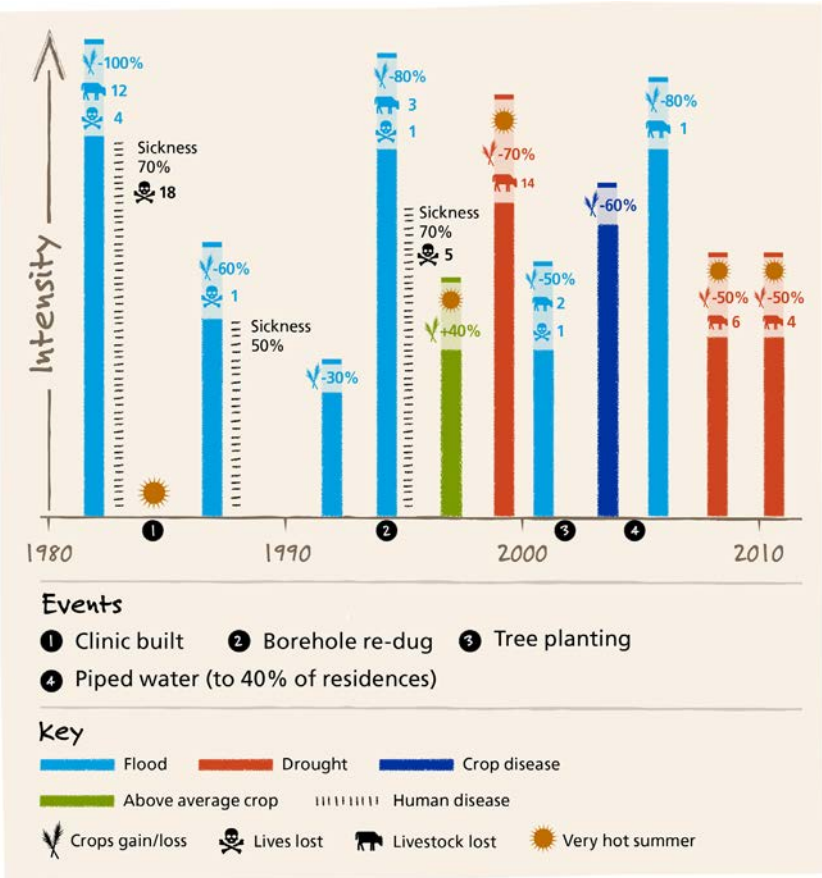
Activity 5

Historical timeline

- ✓ Identify significant flood events in living memory and any trends
- ✓ Understand role of changes and investments on impacts and trends
- ✓ Gather perspectives on causes of changes and trends

Information it will generate

- Community questions
- Flood trends
- Role of changes in NC and PC on flood patterns



Activity 6

Natural capital uses matrix

- ✓ To gather information on how natural capital is used and managed by the community
- ✓ To learn about the role of natural and managed units in community flood resilience
- ✓ To prioritize two natural and two managed units for assessment
- ✓ To find out what factors may put natural capital under threat

Information it will generate

- Natural and managed units (NC)
- Knowledge of role of NC in flood resilience (HC)

LAND UNIT	PREVENT	BUFFER	COPE	RECOVER
River	(0)	(0)	√√√ (3)	√√ (2)
Mangrove	√√√√√ (5)	√√√√√ (5)	√√√√√ (5)	√√ (2)
Forest	(0)	√√√ (3)	√√√√√ (5)	√√√√ (4)
Sea	(0)	(0)	(0)	√√√√√ (5)
Timber plantation	(0)	(0)	√√√√√ (5)	√√√√√ (5)
Irrigated paddy farmland	(0)	(0)	(0)	(0)

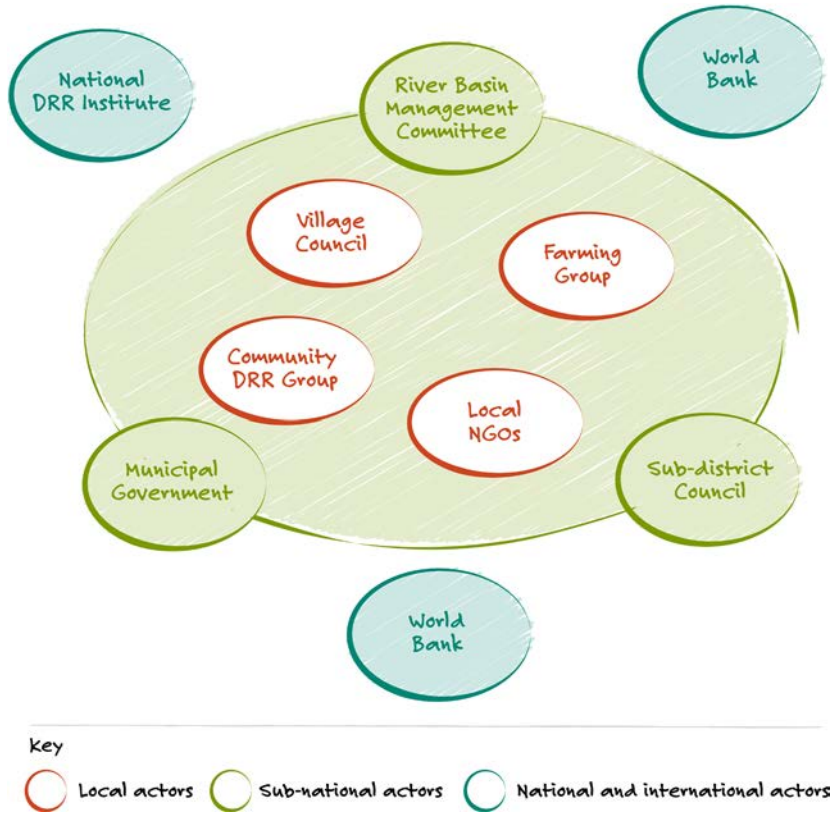
Activity 7

Institutional Venn diagram

- ✓ To understand which institutions are most important the community
- ✓ To analyse engagement of different groups in local planning processes
- ✓ To evaluate access to services and availability of social safety nets

Information it will generate

- Social and financial capital institutions (FC and SC)
- Inclusiveness (SC)



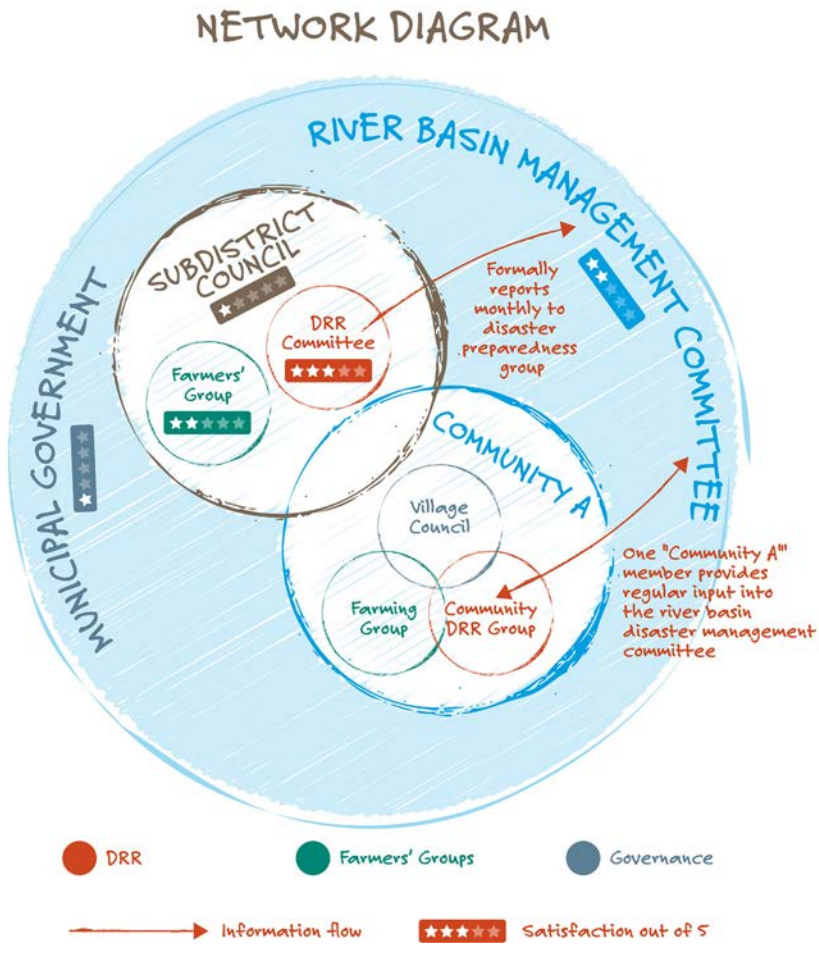
Activity 8

Flood resilience network diagram

- ✓ To gather information on activities and organizations related to flood resilience
- ✓ To learn about levels of participation, inclusiveness, and satisfaction
- ✓ To gather information on links to other authorities, services, and communities

Information it will generate

- Flood-related institutions (SC)
- Inclusiveness (SC)



Grading the sources of resilience and resilience outcomes

Using all the data that has been collected, each source of resilience (for baseline or T-line) or resilience outcome (for post-flood) is graded. This is not a straightforward process. As we have seen, community resilience is not a list of yes/no answers; instead it is about how community flood risks interact with the capitals. So the project team must work together to assess what they have understood through the community engagement and data collection process; this includes the intangible knowledge and experience which is not collected or seen in the data, but is gained through the process and learning of the FRMC.

What to consider when discussing grading

- **Team discussion.** Create the space for an in-depth team discussion, including a reflection on the FRMC framework and flood resilience concept. As well as grading, this is part of the process to build capacity and gain a broader understanding of usefulness and applicability of project interventions.
- **Triangulation.** Where consistent information comes from a number of sources it can be thought of as reliable. For example, you have from a SS that the community has a flood management plan, the community leader KI states there is a flood management plan, and 94 per cent of HH participants say there is a community flood management plan. Therefore it is fair to assess that such a plan exists and is widely known about. The use of multiple data collection methods helps to agree a grade more easily.
- **Weighing.** Where inconsistent information comes from different sources, you need to consider whose view is the most relevant to what you want to understand, or who is more likely to have specific knowledge about something. For example the head teacher at the school or the clinic manager will have more specific knowledge about the school or clinic than the community leader or local official. And even if the police captain KI, village leader KI, and men's community FG all say everyone feels safe all the time even after floods, if the women's community FG say they experience violence after a flood then this direct experience of violence is more relevant than the perception of people who might not want to admit to a problem.
- **Cross-checking.** Use different sources of information you have available to cross-check things. If using the example above, go back to the HH data and see if there is any difference between answers given by men participants and women. While in the HH the majority of people may have reported feeling safe, is the picture the same if you look just at women respondents or those from marginalized groups? Perhaps some subgroups have responded differently.
- **Influence of the process.** Remember that as outsiders your presence will have had an influence on what people did – and importantly did not – talk about. Using the same example again, if the HH women responses does not cross-check with what the women's FG reported, consider any factors related to how the HH was undertaken and how the FG was undertaken that may have caused this. Were women HH participants interviewed in their home with their husbands or children present, or by a male interviewer, or with a community official nearby, or was this just one quick yes/no answer in a long list of many questions? Conversely, was the FG in a safe and private place away from any men or officials? Were they in the company of other women and talking to a female facilitator who encouraged them to be open and honest even about difficult things, and who sensitively raised the issue of violence or feeling unsafe without stigma or judgement, which enabled some women to slowly talk about things they might not have otherwise said to outsiders? Factors such as these may have made one set of data more relevant than another.
- **The bigger picture.** The FRMC helpfully breaks every source of resilience down into the different questions needing to be answered to help you design a process that covers everything. However,

recording the information in this broken down way may result in losing some sense of something that the facilitators gained from the FG. This is why it is so important for the team to discuss the findings – either during the process of data collection and inputting (part of the debriefing process) or working together on the grading process, or both – to ensure that the broader sense of issues that staff gained carries through into the analysis.

- **Is more information needed?** If information varies a lot, inconsistencies are found in the data, or there are simply too many gaps in your knowledge, it is reasonable to go back and collect additional data. Do not feel you have no choice but to grade with what you have, especially if you know it is flawed or has gaps. For example, if HH data and KI with the head of the community have contradictory responses, a second round with a community FG may help to better understand the cause of the contradictory responses.
- **Best judgement.** Agreeing on the right grade is a challenge and not everyone in your team might think like you. Also there may be important local factors that are not really captured by the FRMC. You must interpret the data based on your own experience and use your best knowledge to assess the realistic picture of each source of resilience. If your dataset is small it is even harder, and relies even more heavily on your interpretation of the data. A broader sample size and more information from different data collection methods are most helpful to you. It is also recommended that someone who knows the community very well is involved in the grading process, though we recognize this is often a challenge if FRMC has not been translated into the local language.
- **Continuity.** You will likely be grading a number of different communities, sometimes with data collected by different teams or field staff. As best judgement is required it does mean that who is in the room for the grading does influence the results. Therefore it is recommended to have particular team members involved in all of the grading discussions and involved for all future FRMC assessments such as for T1, T2, or any post-flood assessments.

What are the grades?

FRMC grades each source of resilience and resilience outcome from A to D, with 'A' demonstrating best practice through to 'D' demonstrating significantly below a good standard. Figure 7 shows the general definitions that are followed. However each source of resilience and resilience outcome is accompanied by specific definitions for each grade.

Figure 7 The grading scale

The grading process

1 Representatives of the field team attend a group meeting to discuss the findings

2 The group works together to arrive at grades for each source:

- Review the data from the various questionnaires to get a 'gut feel' for where it stands.
- Compare with the definitions of A, B, C, and D for that source to see where the data stands in terms of the scale.
- Consider the generic scale of A, B, C and D, if required.
- Select a grade.

3 The project lead inputs the grade choice into the tool

4 The project lead explains why that grade was chosen

Figure 8 Suggested process to reach consensus on the grading for each source of resilience

As the project team discusses the findings and the provisional grading of each source of resilience (see Figure 8), some outstanding issues or disagreements are likely to be raised, which should be taken back into the community discussions to get clarifications and feedback from the community, before the grades are finalized.

Discussing the findings with the community

It is recommended that you go back to the community before finalizing the grades. Doing this gives you the opportunity to clarify anything the team did not fully understand or agree on, or to address conflicting information in the data collected.[15] It is also best practice for participatory processes to include participants in drawing the conclusions and making decisions, and not simply use them to collect the information and an external person draw conclusions on their behalf. Whether or not you go back to the community before you finalize the grades, you must go back and discuss the findings with them – the reasons for this are outlined below. Make sure you discuss how flood risks interact with the community's resources, assets, and capacities (capitals). Discussions should not be focused on the grading or overall score, as this is meaningless to the community. The focus must be on what you have learned through the process; what are the strengths relating to flood resilience (areas that have been graded A–B) and where currently the community faces weaknesses (areas that have been graded D–C).

Reasons why we go back to the community:

- This whole process is about their flood resilience, they are central to this process and we must be working in partnership with them throughout the whole process.
- Community members have given their time and information generously, so we must share with them what we have done with their information.
- The process is long and combines lots of elements, and we may have got things wrong or have some follow-up questions. This is their opportunity to say we have not understood correctly, or for us to ask them to help us understand something better.
- The process itself can contribute to increasing flood resilience if the findings are shared, discussed by the community, and acted upon. It can be used to inform planning processes, catalyse local activities, and change personal behaviours.
- The community is most interested in the results as those people who contributed the most to the process. The results are theirs, based on their unique knowledge, and we should be working throughout the process in ways that ensure they feel ownership of the process and have an interest in the results.

15 This requires skilful facilitation, especially as anything related to power and differences of opinion between officials and community participants can be sensitive. Be careful how you present these issues to village leaders and a community meeting. You do not want to introduce bias into the data, but equally you do not want to get something wrong because of a flaw in how data was recorded, interpreted, or analysed. Firstly, make sure that any individuals who have provided conflicting information cannot be identified from anything you say. You can use your role as an 'outsider' to gently probe, you can pretend you do not understand something and ask them to find different ways to explain it to you. Then you could ask difficult questions like 'but couldn't this happen?' or 'would there not be a bad effect like this?' – not in an accusing way that does happen, but posed more as 'I could imagine that…, how would you manage that or has anything like that ever happened?'. Secondly, make sure you are clear there is no right or wrong answer; the key is the relationship between different points of view and how this may impact on a source of resilience. Thirdly, find ways to allow the participants to explore all the different points of view or what some of the issues might be; don't simply ask, 'is it this way or that way'. Finally, find ways to engage participants in understanding and owning the findings – particularly to enable them to feel proud of things that are going well (grades A–B) and giving them the space to discuss what they feel empowered to do about things that could be improved (grades D–C).

Annex 1

Methodology to measure the natural capital sources in the FRMC

A 'Dummies guide to natural capital'

Introduction

Natural capital isn't easy to measure. But we are not expecting field staff to recruit expensive field ecologists to help them measure natural capital. It would be more useful to work with the community in a process that identifies the natural capitals that they view as the most important. So for the FRMC framework, practitioners will need to be able to identify the two most important natural units that provide flood resilience services. The first is a **managed area**, a distinct patch of land or water that is used and managed by the community such as an area of agricultural land or an area used for community grazing. The second should be a largely **unmanaged area**, so a patch of rough ground which is largely unused, or a patch of community forestry which is managed in a natural state, or a pond that provides fishing but remains in a natural state. Each community must select one managed unit and one unmanaged unit, which may sound simple, but isn't, largely for the following reasons:

- There is no standardized naming system for natural areas and at the level of the tool community level habitats themselves may be difficult to identify. But what is important is what the community view as a component of natural capital.
- Natural capital doesn't act in a single way. Natural capital can provide protection services, such as a dense area of trees that reduces the impact of a flood surge, or regulating services, such as a low-lying wetland that provides a drainage space for flood waters to collect. Or natural capital can provide provisioning services such as a patch of forest where the trees provide food and fuel while the community is isolated from local services.

So, to help the community and field workers identify a priority natural and managed unit for measurement in the tool the following process is proposed:

- Map out the community boundary.
- Start by filling in the map with natural components that they already identify with, such as forests, ponds, rivers, etc.
- Now fill in the spaces, being clear there are no gaps.
- Don't forget to include aquatic as well as terrestrial components.
- Triangulate the draft list with natural resource usage using a set of focus questions: for example, where do you collect your building materials from? Do you collect any local plants for consumption or for medicinal purposes? Do you hunt or fish locally, if so where and what for?
- Update the list of natural components adding any new ones identified.
- For each natural component identified explore:
  - the provisioning services that this component provides;
  - any regulatory services this component provides.
- Now you are ready to rank the 'Natural components' based on the services the community recognize.
- The top ranked 'natural components' is the priority 'natural unit' to input into the tool and the top ranked 'managed components' is the priority 'managed unit' to input into the tool.

For the purposes of the tool it doesn't matter what a 'natural capital component' is called provided that the community can identify it, understand what it is, and why it is important. If they refer to a patch of mixed deciduous forest near the temple as the 'community burial area' and a similar patch of mixed deciduous forest on the edge of the village as the 'community forest', then use their names and make a note of these in the notes function in the tool.

Step 1 – Map out the community boundary

As a prerequisite for the measurement tool the field team and community should already be able to identify the community. They should be able to describe how far the community extends in each direction, and therefore delineate the boundary. Based on this understanding the FRMC measures the things inside the boundary over which the community has direct influence, as well as understanding those things that extend beyond this boundary or occur outside the boundary which influence their resilience: the 'enabling environment'. It's not enough to have an administrative map or hand drawn vulnerability map. For the purposes of the tool we need a map that can be used as a tool to explore with the community the constituents of what makes and what reduces their resilience to a flood event. Get a map; it can be a 3D map, a downloaded Google map, a copy of an administrative map, or a hand drawn map produced by the community. It's essential we have a map that can be used.

Step 2 – Map out the easy stuff

Once you have a map the next step is to map out the natural capitals that people already recognize. They may not recognize them as 'natural capitals', so get the community to map out the forest areas, the ponds and wetlands, and the river. Is there a communal grazing area? Map out the natural areas that the community already recognize.

First identify the diversity of natural capital contained within the boundary of the self-defined community identified for measurement by the FRMC. It is important to be clear on the boundary so that we are sure of what is in the community and what is outside. Note that some natural capitals may extend beyond the boundaries of the community; for example a forest area in which some of the trees lie within the boundary of the community area, a lake shared by several communities, or a river of which only a section is perceived by the community as being 'in' the community.

The proposed steps are as follows:

1. **Inventory of natural habitats in the community (need clarity on the boundary of the community):**

- Make a map of the community.
- Map out the key natural habitats (bearing in mind that natural capital is more likely to be located in the periphery outside the living area of the community).
- What natural resources do the communities utilize? (Put these on the map not only for products, but also for livelihoods).
- Check that we have representation of both terrestrial and aquatic habitats.

2. **Consider the flood services contribution made by the natural habitats and rank:**

- How does a flood event play out in the community? (We need to understand what natural factors would reduce flood risk in the community. If it is a high potential/velocity flash flood then look for protective functions; if it is inundation then water storage or drainage functions. Is it provision of key services, e.g. fuelwood or fish for food?)
- Facilitate the community to explore how each natural capital identified contributes to reduce the impact of a flood event (use participatory scoring or ranking exercises, pair wise ranking, matrix ranking, etc., to put the natural capitals into order).
- Prioritize the natural habitats to identify the most important.
- Double check these against the map and a theoretical flood event. There shouldn't be any blank areas on the map; everything should be covered, even if it is roadside verge or the area where the community dump their rubbish – every square centimetre of the community should be included!

Emphasize the values of natural capital to build flood resilience:

- Natural capital is an extremely cost effective contribution to flood management.
- Natural capital is best managed using local indigenous skills so maintenance costs are low and do not require external technical support, thereby strengthening local participation in flood response planning and management.
- Natural flood management works with the catchment's natural defences to slow the flow upstream and increase water storage in the whole catchment, and natural capital can contribute to make flood mitigation measures more robust.

Reminder

- Don't overlook community knowledge especially for historical indications of flooding; ask the people who have lived in the area for a long time how they cope with floods.
- When doing field walks explore areas where debris have been deposited from previous floods or where erosion has occurred and repairs are needed? What do they tell us about flood events, about the severity of flood events and the force of the flood waters? Do large wood materials such as tree logs formed upstream cause damage and destroy houses and other local infrastructure? Where does flood material get deposited and how do the deposits from a flood event affect the community? Does the flood provide silt to agricultural fields providing fertilizer? Or does the flood event deposit a thick layer of gravel on the fields which has to be removed before the community can restart their agricultural production?
- It's important to engage the community in a discussion about the flood events as this will help to unpack the role that all the capitals, not just natural capital, play in community resilience to floods.

Annex 2

Suggested outline of a job description for a Field Enumerator

The Zurich Flood Resilience Alliance (the Alliance) is a multi-sectoral partnership focusing on finding practical ways to help communities in developed and developing countries strengthen their resilience to flood risk. To do so, the Alliance created a conceptual framework, the Flood Resilience Measurement for Community (FRMC) and an associated holistic analysis tool to collect information to better understand flood resilience at the community scale.

In particular, the tool includes a smartphone App to conduct household surveys, for which we are currently recruiting enumerators.

Key Areas of Responsibility

The Enumerator will be responsible for the following:

- Participate in trainings and briefings on the use of the FRMC as designed by the supervisor.
- Work as part of a team of field enumerators, and expected to work together to collect community data based on questionnaires developed and supplied by the programme.
- Submit completed questionnaires and other equipment used in fieldwork to the supervisor.
- Recognize and give account of problems in obtaining data and provide useful feedback on the use of the field survey methodology. This includes providing feedback on the ease of use of the tool, their experience collecting the data, and the quality/integrity of data collected to the team and the supervisor.

Person Specification

Essential:

- Local language skills, speaking, reading, and writing.
- Understanding of the local culture and heritage along with good interpersonal skills.
- Confidence and ability to use mobile applications, especially on the spot trouble shooting.
- Ability to work in remote community context for long working days – endurance and flexibility regarding long working hours, as surveys depend on respondents' availability hence can be very early morning or run late into the evening.
- Ability to build trust with the interviewee, in a non-judgemental way, especially being thoughtful to interviewee's individual situation as some questions may be especially sensitive.
- Sensitivity to the cultural expectations of local people.
- Experience in data collection, administering questionnaires, and conducting interviews.

Desirable:

- Familiarity with the local area, especially understanding of local culture and traditions.
- Experience in the field in a community development context.
- Interest in resilience, disaster risk and especially flood risk management concepts.
- Good English reading skills would aid in understanding the framework.

Flood Resilience Alliance

For more information visit www.floodresilience.net/FRMC or follow @floodalliance on social media.

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