Climate Resilience Measurement for Communities

Glossary

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About this document

The definitions provided in this glossary relate to how these terms are used in the Climate Resilience Measurement for Communities (CRMC). They have been developed by Zurich Climate Resilience Alliance partners from various sources, including UNDRR, IPCC, and WMO.

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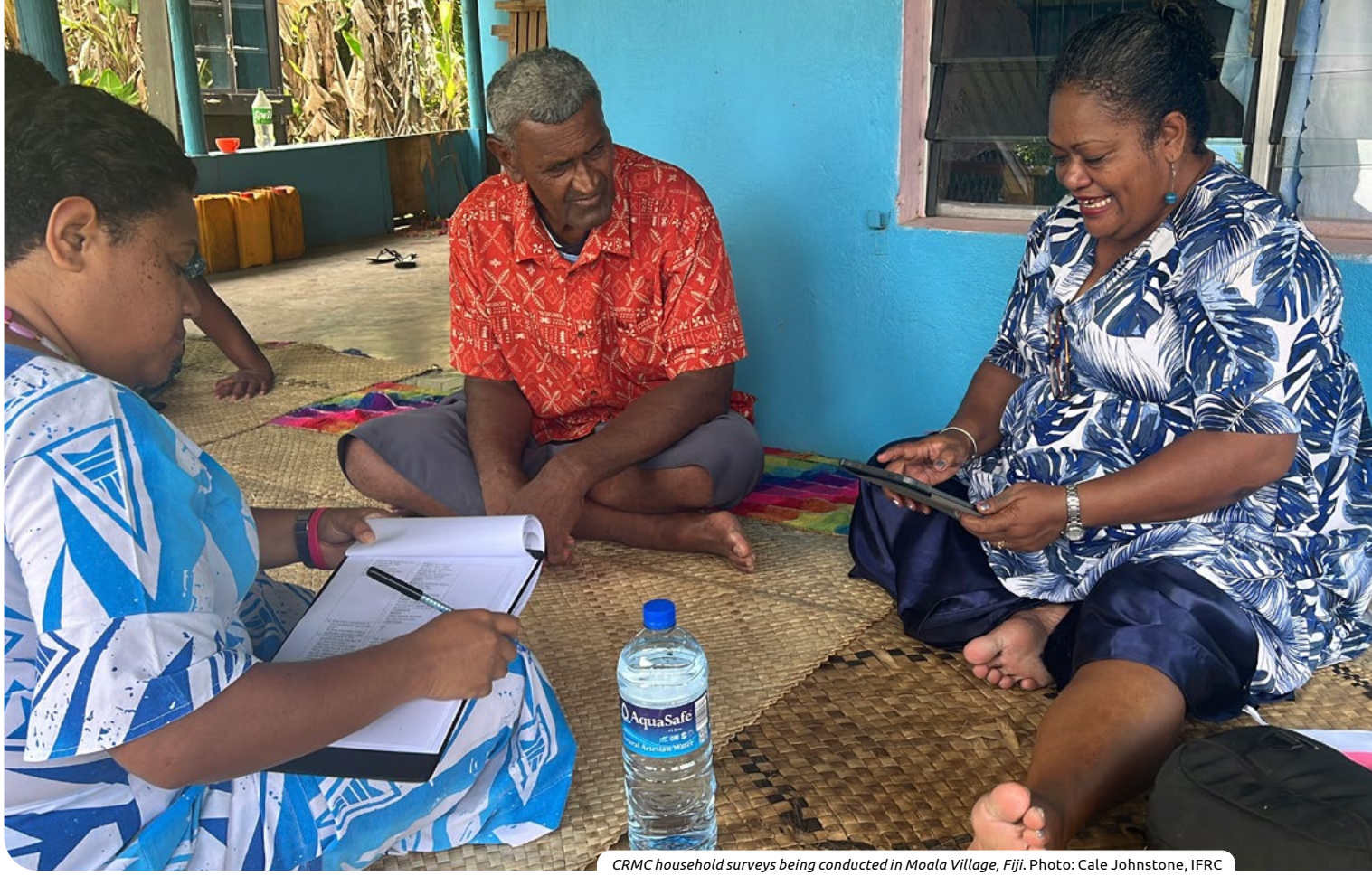


CRMC household surveys being conducted in Moala Village, Fiji. Photo: Cale Johnstone, IFRC

Measuring climate resilience at the community level

Why climate hazards?

As our planet warms and weather patterns change, we are seeing more frequent and intense floods, heatwaves, storms, and wildfires.

These events can take lives, cause serious injury, and inflict lasting psychological trauma. They can uproot communities, separate families, destroy livelihoods, and erase cultural heritage and sense of identity. In their aftermath, we often see ripple effects, such as increased poverty, early marriage of girls, children dropping out of school, or forced migration of men in search of work.

At the same time, they damage critical systems – such as water, electricity, transportation, and communication – and devastate homes, schools, health centres and local hospitals.

Without action to build climate resilience, the situation will get worse because of

- increasing population, urbanization, and economic development in hazard-prone areas;
- increasingly interconnected and interdependent critical systems, where impacts to one system can have cascading effects;
- increasing occurrence of compound events, where individual climate risks occur simultaneously or in rapid succession.

With climate disasters impacting communities around the world, the need for community resilience has never been greater.

Why resilience?

We find that 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 disaster 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, the Zurich Flood Resilience Alliance originally developed a consistent Flood Resilience Measurement Framework and the tools to implement this framework, which has now progressed to the Climate Resilience Measurement for Communities (CRMC) framework and associated tools.

Using our measurement framework and data, we are contributing to the evidence on how to build resilience. In turn, this will help to increase social, political, and financial investment in building resilience to climate-related hazards.

Why focus on communities?

While acknowledging that national and global drivers play a significant (and essential) part in building resilience, we have chosen to focus on resilience measurement at the community level.

This is the level where impacts from climate-related hazard events are felt most immediately and where much action on enhancing resilience can be taken.

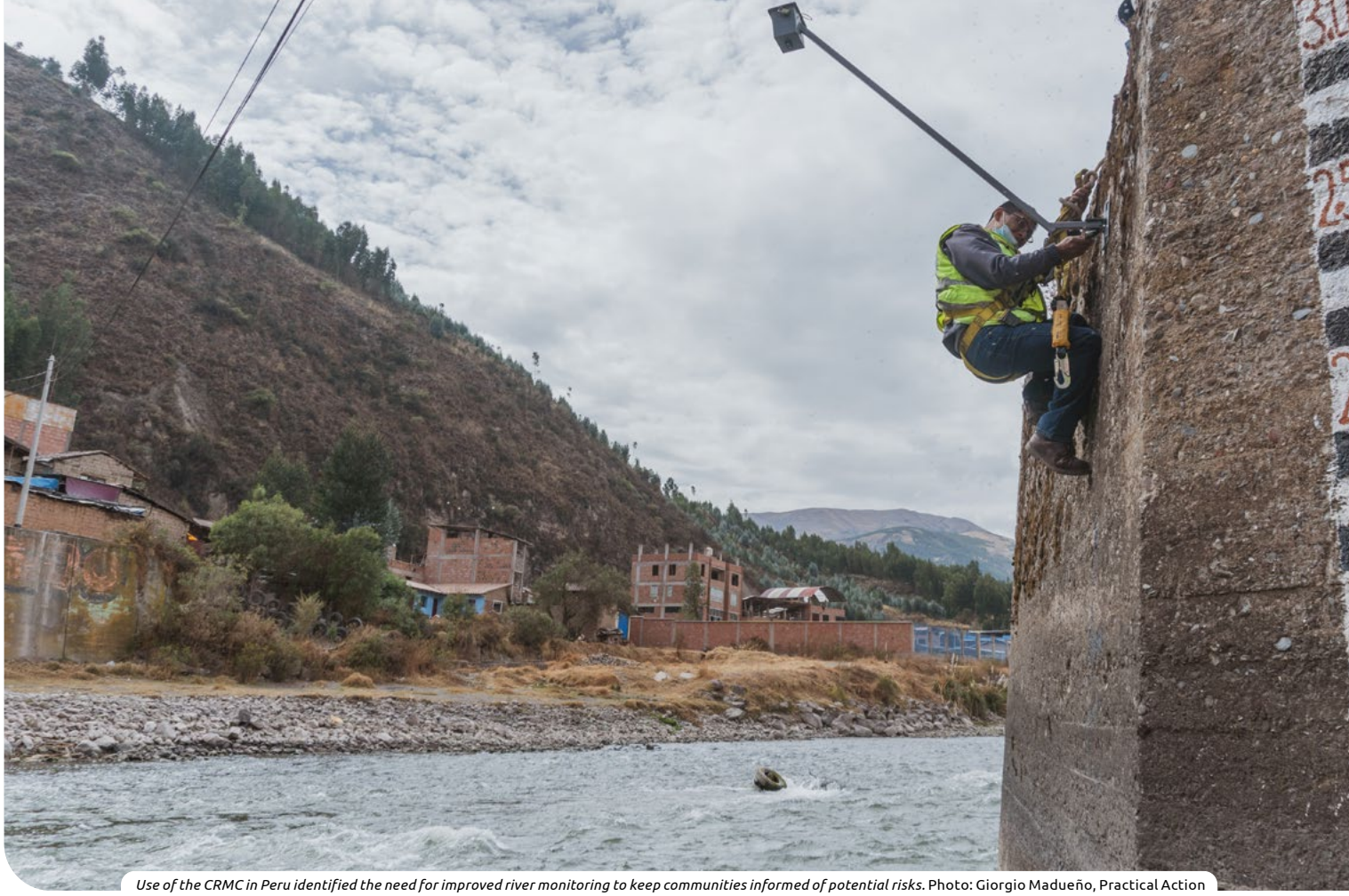
Communities are not homogeneous – they are made of people with diverse identities, needs, and vulnerabilities. By working at this level, we can better understand and address those differences, ensuring that resilience-building efforts are more inclusive and equitable.

It is also the level where we can demonstrate a tangible impact on people's lives, creating best practices in the field that can help us shape and influence policy at a higher level.

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, ODI, London/Global Facility for Disaster Reduction and Recovery at the World Bank, Washington, DC.

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. https://zcralliance.org/resources/item/disaster-resilience-what-it-is-and-how-it-can-engender-a-meaningful-change-in-development-policy/



Use of the CRMC in Peru identified the need for improved river monitoring to keep communities informed of potential risks. Photo: Giorgio Madueño, Practical Action

The Climate Resilience Measurement for Communities (CRMC)

The CRMC comprises two parts: the Alliance's conceptual framework for measuring community resilience to a set of climate-related hazards, and an associated tool for implementing the framework in practice.

The second component of the CRMC – the tool – is a practical hybrid software application comprising an online web-based platform for setting up studies and analysing the data, and a smartphone- or tablet-based app that can be used offline in the field for data collection.

The CRMC process is often part of a wider community disaster risk reduction and/or development programme and does not stand alone. Certain parts of the process, such as project set-up and community engagement, are meant in the wider sense of community programming and are not just about implementing the measurement using the tool.[4]

4 For more information on the conceptual framework, please see the CRMC overview: https://zcralliance.org/resources/item/the-climate-resilience-measurement-for-communities-crmc/

The CMRC process

Set up the project

1

Select a site

2

Define and understand the community

3

Recruit fieldworkers

4

Set up a study
(either T-line or post-event)

5

Plan the data collection

6

Collect data in the community

7

Grade the sources
(or outcome variables)

8

Analyse the results

9

Share the results

10

Implement interventions

11

Assess the interventions

12

Validate users and content continuously

13

- Set up measurement activities
- Select data collection methods
- Send assignments to fieldworkers' smartphones

- Collect data based on assigned methods
- Store the data offline
- Send the data to the web application when the job is complete

- Consolidate all data for the assessment
- Assign grades using the assessment methodology

- Visualise and analyse the measurement results
- Access guidance on how to interpret the results

- Store the resilience measurement results for comprehensive analysis and validation

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2ndary source data: data or information that has already been collected and is readily available to answer CRMC data collection questions. This may include previously collected data such as vulnerability capacity assessments, information from other projects or organizations, census data, national or international datasets, government data, etc. Data can be in any format, including on- or offline.

4Rs: the four properties of a resilient system: robustness, redundancy, resourcefulness, and rapidity. Drawn from Bruneau et al. (2003),[5] the 4Rs are complementary elements of resilience that, together, enhance community resilience and therefore provide a 'systems analysis' approach. (For definitions of the four properties, see robustness, redundancy, resourcefulness, and rapidity within this glossary.)

5Cs: the five livelihood capitals: physical, financial, human, social, and natural capital. These five capitals are complementary; all five together help sustain and improve community inhabitants' well-being and provide a holistic picture of a community's resilience. The multiple capital approach has been popularized by the well-known and well-utilized Sustainable Livelihoods Framework (DFID). By exploring community resilience in this way, we are explicitly making links between community resilience and development more broadly. (For definitions of the five capitals, see physical capital, financial capital, human capital, social capital, and natural capital within this glossary.)

Adaptive capacity: the ability of systems, individuals, groups, institutions, and other organisms to respond to change by adjusting to potential negative impacts, taking advantage of opportunities, or responding to consequences. Systems with high adaptive capacity have features such as flexibility, diversity, and the ability to learn and self-organize.

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5 Bruneau, M., Chang, S.E., Eguchi, R.T., et al. (2003) 'A framework to quantitatively assess and enhance the seismic resilience of communities', Earthquake Spectra 19(4): 733–52. https://doi.org/10.1193/1.1623497

Affected (directly/indirectly): people who have been impacted, either directly or indirectly, by a hazardous event. Those who are directly affected have suffered injury, illness, or other health effects, were evacuated, displaced, or relocated, or have suffered direct damage to their livelihoods or economic, physical, social, cultural, or environmental assets. Those who are indirectly affected have suffered consequences other than direct effects, such as disruption or changes to critical infrastructure, basic services, markets, or the economy, or social, health, or psychological consequences related to the secondary effects of the event, like lost income or vector- or waterborne diseases made worse by the event, etc. Indirect impacts can be immediate, long term, or both.

Assets: things, like buildings and their contents, machinery, vehicles, animals, land, crops, stock, and infrastructure. Productive assets are the assets that community members rely on for their livelihoods (e.g. construction tools, a car, a sewing machine).

Baseline: the first application of the CRMC in a community. See also T-line study.

Basin: an area of land that drains all the streams and rainfall within that area to a common outlet, such as a lake, reservoir, bay or ocean, wetland, or larger stream or river. A basin can be thought of as acting like a funnel, collecting all the water within it and delivering that water to a single point at the bottom. The terms basin, river basin, catchment, and watershed are used interchangeably.

Capacity: the ability to do a specific thing, which requires having the appropriate knowledge, skills, and resources.

Capital: see 5Cs.

Cascading failures: failures in a system that lead to a series of failures in the same or other systems. For example, failures in an electricity system can lead to failures across a range of systems that rely on electricity to function, including but not limited to water treatment, communications, and transportation.

Child/children: people under 18 years of age are considered children in most CRMC applications. For example, household surveys cannot be administered to people under 18. People aged between 18 and 21 can be considered children in some contexts, whereas in some communities, people under 16 are considered children. In applying the CRMC, the definition of a child can be locally defined where it is not explicitly defined.

Climate change: a change in local, regional, and/or global climate patterns, and in particular, a systematic change in weather that has become increasingly apparent in the last two or three decades and which is attributed to increased levels of greenhouse gases in the atmosphere caused by the burning of fossil fuels.

Climate change adaptation: changes in ecological, social, or economic systems in response to experienced or projected climate changes. This includes changes in processes, practices, and structures to reduce potential damages or to benefit from opportunities associated with climate change.

Climate change mitigation: reducing emissions of heat-trapping greenhouse gases into the atmosphere (e.g. by using less coal and gas, or by switching to solar energy or wind power), or by increasing the absorption of carbon from the atmosphere (e.g. through reforestation).

Climate resilience: the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives, while managing its climate risks over time in a mutually reinforcing way.

Climate services: information and products that enhance users' knowledge and understanding about the potential impacts of climate, climate change, and climate variability. Climate services can aid decision makers in understanding the potential impacts of climate on their decisions and actions.

Coastal floods: the flooding of land areas along the coast by seawater. Common causes of coastal flooding are increasing high tides and storm surges, which result from climate change-associated sea level rise, and land subsidence and tsunamis, which are not directly linked to climate.

Coastal zone: the interface between the land and the sea, defined as the part of the land affected by its proximity to the sea, and the part of the sea affected by its proximity to the land.

Co-benefits: the positive effects that a measure aimed at one objective might have on other objectives, thereby increasing the total benefits for society or the environment. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors. Co-benefits are also referred to as ancillary benefits.

Community: communities can be geographic or place based, social or identity based, and/or functional or interest based. In the context of community climate resilience and the CRMC, the primary understanding of 'community' is geographic or place based, because the disasters included in the CRMC have a geographic footprint, and many of the sources of resilience are geographically specific. Because of this, a community is understood as a group of people living in the same physical location, for example, a town, suburb, or neighbourhood, who face a shared risk of disaster.

Community-level context: aspects that the community has direct control over or that are within the sphere of influence of the community, for example, local-level evacuation preparedness or first aid knowledge.

Context: each CRMC source is assigned to one of two contexts: community level or enabling environment. This distinction may assist in designing interventions because it highlights at which level action or advocacy needs to be targeted. (For definitions of the two contexts, see community-level context and enabling environment context within this glossary.)

Contingency planning: backup planning, or a plan developed in case the expected plan fails or is not sufficient. Contingency plans are often used for risk management to enable timely, effective, and appropriate responses even to unexpected events.

Coping: the ability of people, organizations, and systems, using available skills and resources, to manage adverse conditions, risk, or disaster. The capacity to cope requires continuing awareness, resources, and good management, both in normal times as well as during disasters or adverse conditions. Coping can be positive or negative: it can be handling a situation well and thriving despite conditions; it can be the adoption of negative coping strategies, like skipping meals or taking predatory loans just to survive; or it can be anything in between.

Corrective risk reduction: the actions taken to reduce risk to already at-risk assets, such as building rain gardens to capture and slow surface flooding, weatherproofing homes so they remain cooler during extreme heat, or more securely attaching roofing to better withstand extreme winds.

Critical infrastructure: the physical structures, facilities, networks, and other assets which provide services that are essential to the social and economic functioning of a community or society. This includes food, water, power, communication, transportation, shelter, and sanitation services.

Direct impact: the immediate, direct, easily measurable impacts of a hazard event, such as people injured or killed, and damage to buildings, infrastructure, and natural resources.

Disaster: a serious disruption of the functioning of a community involving widespread human, material, economic, or environmental losses and impacts, which exceeds the ability of the affected community to cope using its own resources.

Disaster 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.

Disaster risk: the likelihood of loss of life, injury, or destruction and damage from a disaster. Disaster risk is hazard dependent and is a function of the hazard, the exposure to the hazard, and the vulnerability to the hazard.

Disaster risk management (DRM) cycle: the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. We define five stages of the DRM cycle: prospective risk reduction, preparedness, response, recovery, and corrective risk reduction. However, because it is a cycle, in practice, the stages blend into one another. (For definitions of the five stages, see prospective risk reduction, preparedness, response, recovery, and corrective risk reduction within this glossary.)

Disaster risk reduction (DRR): a broad term that includes anything done to prevent or reduce the damage caused by natural hazards. This includes preventing the creation of more exposure and vulnerability, reducing existing exposure to hazards, and reducing the vulnerability of people and property to hazards.

Early warning system: a system that provides people with advance warning of a potentially hazardous event, giving them time to protect themselves, important assets, and important services.

Ecosystem services: the benefits people obtain from ecosystems. These can be tangible, such as food, fuel, fibre, fresh water, and clean air, or intangible, such as climate regulation, maintenance of biodiversity, and cultural and spiritual services. These services may have monetary or non-monetary value.

Enabling environment context: outside the direct sphere of influence of the community, that is, aspects that the community does not have direct control over. For example, integrated flood management planning is done at a municipal scale, not a community scale, and is therefore part of the enabling environment for the community.

Energy burden: percentage of income devoted to energy costs. Low-income households typically live in energy-inefficient homes and therefore pay more, as a percentage of their income, than the average household. This makes it more difficult for these households to cope during extreme temperature events. High energy burdens are correlated with greater risk for respiratory diseases, increased stress and economic hardship, and difficulty in moving out of poverty.

Equality: the principle that all persons, regardless of their gender, age, nationality, race, ethnicity, ability, sexual orientation, socio-economic status, religious beliefs, political beliefs, caste, or other ideologies, should enjoy the same status in society, have the same entitlement to all human rights, enjoy the same level of respect in the community, have the same opportunities to make choices about their lives, and have the same amount of power to shape the outcomes of these choices.

Equity: the deliberate process of being fair to produce equal and measurable outcomes, recognizing that people are not all in the same 'starting position'. Equity is a core principle of sustainable development, aligned with ideas of equality, fairness, and justice in the distribution of resources, opportunities, risks, decision-making power, and costs and benefits of policies across a society. Addressing social equity involves taking action to redistribute resources and power to groups that have been systematically disadvantaged due to race, ethnicity, gender, sexuality, socio-economic status, and other social identifications.

Evacuation: moving people and assets temporarily to safer places before, during, or after the occurrence of a hazard event to protect them.

Evacuation plan: arrangements established in advance to enable the moving of people and assets temporarily to safer places before, during, or after the occurrence of a hazard event. Evacuation plans may include plans for the return of evacuees and options to shelter in place.

Exposure: when people, infrastructure, housing, production capacity, and other tangible human assets are in hazard-prone areas. Exposure may be known, such as a mapped 100-year flood zone, or unknown/unanticipated, as is being seen with growing extreme heat and wildfire risk. Understanding the changing exposure landscape is one of the challenges of climate change.

Extreme heat: prolonged periods of temperatures significantly above the historical record for a location. A heatwave is a version of extreme heat; however, extreme heat can also be more extended or chronic, for example, an entire summer of abnormally high temperatures.

Financial capital: level, variability, and diversity of income sources and access to other financial resources that contribute to wealth.

Flash floods: flooding due to the sudden release of water over a short period of time, for example, due to heavy rainfall, a levee break, a sudden break-up of debris or ice jams, or the emergency release of water from an upstream dam. Flash floods occur within minutes to hours after rainfall or water release and produce raging water that moves with great speed.

Flood: an overflow of a large amount of water beyond its normal limits, especially over what is normally dry land. Four types of floods are flash floods, river floods, coastal floods, and surface floods.

Focus group discussion: several pre-invited or self-selecting respondents (ideally no more than 20) participating in a structured conversation. For the CRMC process, focus group discussions are moderated by the local fieldworker, and more than one focus group can be run for a given CRMC question. Focus groups can be groups that formally exist and meet regularly or can be informal and convened specifically for the CRMC data collection process.

Gender: the characteristics of women and men that are socially constructed. Gender includes the social differences between women, men, and non-binary individuals that have been learned, are changeable over time, and have wide variations both within and between cultures. (Definitions for gender equality and social inclusion (GESI), equity, and equality are included within this glossary.)

Gender equality and social inclusion (GESI): the actions needed to ensure that everyone has equal access to resources, opportunities, and benefits, regardless of gender or other social factors. GESI is a process that aims to overcome barriers and create an enabling environment for all people to participate fully in society.

Grade: every CRMC source of resilience is awarded a grade between A and D, according to the data collected. In general, grades follow the scheme of

- A: best practice;
- B: good standard, no immediate need for improvement;
- C: deficiencies, room for visible improvement;
- D: significantly below good standard, potential for imminent loss

Each of the four grades for each source of resilience has a specific definition or justification statement to help the user team understand how to use the data they have collected to assign a grade.

Hazard: a substance, object, or situation that has the potential to cause damage to life, property, or the environment. Hazards can be natural or non-natural. Natural hazards like floods and heatwaves are caused by weather, climate, and geophysical drivers, whereas non-natural hazards like blackouts and economic downturn are caused by social, political, economic, and technological failures. The hazards included in the CRMC are floods, heatwaves, wildfires, and storms; the likelihood of these hazards can typically be modelled, and the exposure to these hazards can be mapped using hazard maps.

Heatwave: a multi-day period of extreme heat where temperatures are markedly higher than typical local and seasonal conditions, and there are significant heat impacts to human and/or natural systems. There is no universal definition of heatwaves, and different approaches are adopted in different locations. There is also no agreed duration of a heatwave, although it is generally not less than two to three days (or nights) of high temperatures.

Household: a group of people sharing the same living accommodation, pooling some or all their income and wealth, and consuming certain types of goods and services collectively, mainly housing/shelter and food. A household may be in a housing unit (house, flat, etc.) or in a set of collective living quarters, such as a boarding house, a hotel, or a camp. The household may also be homeless. A one-person household makes provision for their own essentials for living without combining with any other person. A multi-person household is a group of two or more people living together who make common provision for at least some essentials for living.

Household survey: a series of CRMC data collection questions asked by a local fieldworker to an individual household, with answers inputted into the CRMC mobile app. Household surveys can be administered in person, via a phone interview, or via an emailed electronic survey.

Human capital: the knowledge, education, skills, and health of the people in a community.

Impermeable surfaces: landscape surfaces that do not allow water to soak into the ground, such as conventional paved or sealed roads, pavement, concrete paths, building roofs, bare rock, high-clay soils, etc. A high proportion of impermeable surfaces tend to make both flooding and heat worse. They are the opposite of permeable surfaces (see permeable surfaces), which are surfaces that easily absorb water.

Indigenous knowledge: the understandings, skills, and philosophies developed by societies with long histories of interaction with their natural surroundings. For many Indigenous Peoples, Indigenous knowledge informs decision-making about fundamental aspects of life, from day-to-day activities to longer-term actions, including resource-use practices, social interactions, values, rituals, and spirituality.

Indigenous Peoples: the United Nations Declaration on the Rights of Indigenous Peoples and other major frameworks do not define the terms Indigenous or Indigenous Peoples. Typically, Indigenous Peoples are considered to be the descendants of the original inhabitants of an area at the time when people of different cultures or ethnic origins arrived. The new arrivals later became dominant through conquest, occupation, settlement, or other means. Indigenous Peoples often have a historical connection to a specific territory or region, a strong connection to the land and its resources, and have maintained distinct social, cultural, economic, and political systems that are often different from the dominant societies within that region. We note that this definition is not intended to ignore differences and diversity within and among Indigenous Peoples; the specific definition can change depending on the country/local context. Indigenous Peoples primarily define themselves through self-identification and self-definition.

Indirect impact: the secondary impacts resulting from a hazard event, such as cascading failures in interdependent systems, economic disruption, secondary health impacts such as vector or waterborne disease outbreaks in the case of flooding, etc. Indirect impacts can be immediate, longer term, or both.

Institutions: the rules, norms, beliefs, and conventions that shape or guide human relations and interactions, and access to and control over resources, goods and services, assets, information, and influence. Legal norms are the formal rules and regulations created by legislative and administrative bodies. Cultural norms are informal rules, or social and cultural expectations, that govern human behaviour.

Interventions: a deliberate action or group of actions designed to create change and build resilience. An intervention can be a piece of hardware such as a platform for poultry to take refuge on, a technique like digital risk mapping, a tool such as an online app, a method or approach such as developing community disaster management committees, a system such as an early warning system, or infrastructure like a multi- purpose shelter or bio-dyke.

Key informant interview: an in-depth interview between a local fieldworker and a person or people who have specialist knowledge about the community, designed to provide answers to CRMC data collection questions.

Land-use planning: formal management of land development by mandated authorities. Ideally, land-use planning should ensure that land use is efficient, ethical, and minimizes exposure to hazards.

Livelihoods: a means of making a living. A livelihood encompasses a person's capabilities, income, and activities required to secure the necessities of life via income or subsistence.

Local knowledge: the understandings and skills developed by individuals and populations specific to the place where they live. Local knowledge informs decision-making about fundamental aspects of life, from day-to-day activities to longer-term actions.

Marginalized: also called socially excluded. This refers to individuals or groups being denied access to areas of society due to a lack of access to rights, resources, and opportunities. Marginalization can be economic, social, or political and puts people in powerless positions.

Marginalization can occur for cultural or social reasons (such as gender, ethnicity, age, religion, or sexual orientation), economic reasons (such as people living in poverty or who are homeless), or because of physical attributes (such as those living with a disability, or people with mental illness or drug addiction).

Minority: any group of people who, because of physical, cultural, or other characteristics, are singled out for differential and unequal treatment. Note that being a numerical minority is not necessarily a characteristic of being a minority group; sometimes numerical majority groups are social minority groups due to their lack of power. It is often the lack of power that is the predominant characteristic of a minority or subordinate group. Many, but not all, minority groups regard themselves as objects of collective discrimination.

Multi-hazard: the consideration of how one hazard can affect or increase the impact of another hazard, where the occurrence of one hazard can trigger other hazards or consequences relevant to other hazards (such as cascading hazards, e.g. extreme rainfall and flooding causing landslides), or where the possibility of two hazards occurring close to each other or concurrently intensifies the consequences (compounding hazards, e.g. a flood and heatwave occurring simultaneously). In particular, a multi-hazard approach focuses on how hazards are interconnected. This is different from a 'multiple hazard' approach where more than one hazard is considered, but hazards may be considered in isolation. (See also multiple hazard in this glossary.)

Multiple hazard: an approach where a set of natural or other hazards are assessed or covered in programming alongside one another, recognizing that a community is usually not affected by a single hazard but by multiple hazards, for example, flooding, heat, and storms. Such assessment or programming approaches take into account that work, processes, interventions, etc. should not be carried out focusing on a single, isolated hazard, but that the work considers the range of hazards faced by communities. However, such work may not focus on the interconnected nature of these hazards. (See also multi-hazard in this glossary.)

Natural capital: the natural resource base, including land productivity and actions to sustain it, as well as water, clean air, fisheries, and other resources that sustain livelihoods and well-being.

Natural environment: the living and non-living components that occur naturally (that are not made by humans), including ecosystems and the ecosystem services they provide. The opposite is the built environment, where humans have significantly altered the landscape, such as agricultural and urban settings.

Negative coping strategies: also known as erosive coping strategies. These are activities undertaken in response to a disaster or threat that erode the long-term well-being of a person or household. Negative coping strategies include unsustainable environmental exploitation, skipping meals, taking children out of school, undertaking risky activities, selling productive assets, etc.

Percentage: a number or ratio expressed as a fraction of 100, often denoted using the per cent sign, %. Percentages are often used to express a proportionate part of a total. For example, if 50 per cent of households in the community work in agriculture, that means that 50 out of every 100 households work in agriculture, and if there are 200 households in the community, then 100 of them work in agriculture. The per cent value is computed by multiplying the numeric value of the ratio by 100. For example, to find 30 households as a percentage of a total 200 households, first compute the ratio by dividing 30 by 200 (30/200) = 0.15, and then multiply by 100 (to obtain 15 per cent).

Permeable surfaces: landscape surfaces that allow water to soak into the ground, such as soils, green space, water surfaces, shrub and tree cover, dirt or paved roads, permeable pavement, and green roofs. Greater permeability of the landscape is beneficial in both flooding and heat. Permeable surfaces allow water to soak into the landscape, resulting in less run-off and less contamination. Permeable surfaces also help lower the urban heat island effect because they typically do not absorb and retain as much heat as impermeable surfaces and they cool through evaporation.

Physical assets: things that can be bought or sold. Physical assets are also known as tangible assets. For households, physical assets usually refer to a home (if not rented) and its contents, vehicles such as motorcycles or cars, and possibly also productive livelihoods assets such as tools or computers. For businesses, physical assets usually refer to properties, equipment, and inventory/stock. See also productive assets.

Physical capital: the built environment and infrastructure, such as buildings, roads, utilities, and communications systems, which support the functioning of a community.

Post-event study: an assessment taken after a hazard event occurs in a project community, like an impact assessment. In the CRMC, the post-event study is set up and implemented with the same process as a baseline or T-line study but has different indicators that measure the actual impacts of the hazard event (flood, heatwave, storm, or wildfire). Post-event study grades can further deepen the understanding of community resilience but are not directly comparable to T-line grades.

Pre-emptive: action taken before a hazard event occurs to reduce the potential impacts that a hazard could cause. Pre-emptive actions are taken in normal times, not in the immediate lead-up to a hazard event (actions taken in the immediate lead-up are typically referred to as preparedness).

Preparedness: precautionary actions taken prior to hazard events, particularly in the lead-up to the event or season where events are likely, in order to get ready for the event. At the household level, preparedness includes understanding personal risk and knowing what actions to take to avoid or reduce loss (such as moving papers and equipment off the ground when a flood warning is received). At the community level, preparedness could include developing pre-established evacuation routes. At the district or national levels, preparedness could include humanitarian agencies pre-positioning emergency relief supplies.

Productive assets: tangible physical assets (see physical assets) that are used to generate income. Examples include a moto-taxi, livestock/animals, and farming or business equipment.

Programme sustainability: the impacts of an Alliance programme or project live on beyond Alliance team presence or funding. If a programme is sustainable, the impacts endure, function, and remain relevant beyond the lifetime of the programme.

Prospective risk reduction: actions taken to avoid the build-up of new or increased risk, for example, building regulations and land-use planning that limit construction in the flood-plain or building codes that require weatherproofing and light-coloured roofs to reduce building heat in the summer.

Rapidity: the ability to contain losses and recover in a timely manner, for example, access to quick finance for recovery.

Recovery: the actions taken after a disaster (either in the short or long term) to help people cope with disaster impacts, reconstruct damaged physical systems (e.g. homes, roads, damaged flood protection structures), and restore services.

Redundancy: functional diversity, for example, having many evacuation routes.

Remittances: a voluntary, private transfer of money made by a migrant to their family, community of origin, or other individual. Money may be transferred electronically or via other means.

Resilience: see climate resilience and disaster resilience.

Resourcefulness: the ability to mobilize when threatened, for example, the ability to quickly turn a community centre into a cooling centre.

Response: actions taken during and immediately after a disaster to prevent, contain, or reduce disaster impacts. Response includes both actions to contain the hazard itself, such as firefighting operations or erecting mobile dykes to contain flood-waters, as well as actions to protect people, such as evacuation, search and rescue, first aid, and emergency relief distribution.

Risk: see disaster risk.

River floods: these occur when water levels in rivers, lakes, and streams rise and overflow onto the surrounding banks, shores, and neighbouring land. The water level rise could be due to excessive rain or snow-melt, a dam or levee break, or upstream reservoir releases.

Robustness: the ability to withstand a shock, for example, bridges built to withstand flood-waters or roads built to withstand extreme summer temperatures.

Secondary source data: see 2ndary source data.

Social capital: social relationships and networks, including bonds that aid cooperative action and links that facilitate exchange of and access to ideas and resources.

Social inclusion: a process of improving the terms of participation in society, particularly for people who are disadvantaged or marginalized, through enhancing opportunities, access to resources, and respect for rights.

Source of resilience: the CRMC is an index-based framework, which means it contains a set of indicators, called 'sources of resilience' – or 'sources' for short. Each source is assigned to one of the 5Cs and 4Rs, as well as a number of other lenses. Each source is awarded a grade from A–D. The sources for both T-line and post-event studies are graded by a trained assessor or assessment team.

Storm: a large footprint, multi-hazard event, including some but not necessarily all of extreme wind, heavy rainfall, storm-water run-off, flooding, storm surges, and landslides. Storms are typically typhoons, hurricanes, cyclones, and tropical depressions, but can also include extreme thunderstorms.

Surface floods: these occur when the amount of water (from rainfall, overflowing rivers, or the ocean) is more than the capacity of drainage and infiltration, and water starts collecting on the land surface. Surface floods, sometimes called pluvial floods or ponding, generally accumulate slowly, and the water is slow moving or stagnant. Surface floods are therefore less threatening to life and health but can still cause significant economic damage. Surface flooding occurs in lower-lying, flat areas. In urban areas, surface flooding is often linked to a lack of drainage, insufficient drainage, or blocked drains.

Systems thinking: a way of thinking that recognizes that situations and problems are composed of interconnected, interdependent components that must work together to deliver needed services and functions, and therefore seeks to understand what the system components are, how they interact, and what influences these interactions.

Theme: in the CRMC, each source is assigned one of seven themes: assets, livelihoods, natural environment, life and health, critical systems, governance, and social norms. Questions in surveys are organized by these themes because they are typically initially easier for practitioners to work with than the other lenses.

T-line study: following the baseline, subsequent applications of the CRMC in the same community.

Tributary: a stream or river that flows into a larger stream, river, or body of water. A tributary does not flow directly into a sea or ocean.

Underlying disaster risk drivers: processes or conditions, often development related, that influence the level of disaster risk by increasing exposure or vulnerability or reducing capacity, for example, upstream land use that increases run-off and downstream flooding, or urban development that replaces natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat.

Urban greening: a strategy of using trees and other vegetation to reduce urban heat island effects and pollution while also enhancing water management, urban biodiversity, and public amenities. Urban greening is a strategy being pursued by city governments as a response to climate change and to enhance the overall livability of cities.

Urban heat island: a city or urban area that is significantly warmer than surrounding areas.

Urban heat island effect: excess heating caused by the replacement of natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat, and by waste heat generated by energy usage. The temperature difference resulting from the urban heat island effect is typically larger at night than during the day.

Vulnerability (of assets): a combination of exposure to a hazard, sensitivity to that hazard, and the ability to adapt to that hazard. This is also known as physical vulnerability, as distinct from social or economic vulnerability. 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 is therefore better adapted and less sensitive to the hazard, whereas the other is not.

Vulnerable people/groups/population: groups of individuals who are at a higher risk of experiencing negative impacts from disasters due to factors like socio-economic status, health, age, and access to resources. They find it harder to anticipate, cope with, resist, and recover from the impact of a hazard. The concept is relative and dynamic. Vulnerability is most often associated with poverty, but it can also arise when people are marginalized, isolated, insecure, and defenceless in the face of risk, shock, or stress. Potentially vulnerable groups include displaced populations; 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.

Watershed: see basin.

Wildfire: an unplanned or uncontrolled fire that is ignited in an undeveloped area. It may be ignited by human or natural means, including lightning, unauthorized human causes (accidental or deliberate), and escaped prescribed fires.
The term includes grass fires, forest fires, and scrub fires, both with and without a suppression objective. It is important to note that wildfire is a natural part of some ecosystems.

Climate Resilience Alliance

Climate Resilience Measurement for Communities

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Intellectual Property note:

a) Since 2013, the Alliance has successfully been developing and implementing the Flood Resilience Measurement for Communities ("FRMC") approach, which includes the underlying framework for measuring community flood resilience, the software to apply the framework (the FRMC tool) and associated training materials, which has been used in over 400 communities globally. The development and writing of the training materials including the user guides has been the joint work of the Alliance.

b) The Climate Resilience Measurement for Communities ("CRMC") is the next evolution of the FRMC, meeting the increasing demand to measure resilience to multiple hazards in order to accelerate climate change adaptation. The typology has been further sharpened whilst retaining the three core elements of community centricity, hazard specificity and development focus. The CRMC has been developed as a product of the Alliance.

c) The software: The FRMC and CRMC software has been developed and is maintained by Zurich. Currently, the software includes the four hazards developed for the framework and implemented by Zurich through the software provider, floods, heatwaves, storms and wildfires, and can be amended from time to time as appropriate as new technology becomes available or further climate-related hazards are added.

d) The data: All data are collected in accordance with ethical data collection practices, and are anonymous at the individual and household levels. The data within the tool ultimately are controlled by the organizations that collected it. As a condition of using the framework, all organizations have agreed that data will be stored in a central database and be used for research purposes. User organizations can download all of their data at any time.

e) Use-rights: The Foundation and the Alliance are keen for the CRMC to be used as widely as possible. Existing partners are encouraged to expand use of the tool within the remit of their work.

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Installing a siren in Huế City. Photo: Huế DRM Office

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