

RESILIENCE  
TO NATURE'S  
CHALLENGES

Kia manawaroa –  
Ngā Ākina o  
Te Ao Tūroa

# The Resilience Indicators Bank and the New Zealand Resilience Index

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# Overview

Understanding and enhancing the disaster resilience of our communities is a national priority in New Zealand. There are efforts at the national, regional, and local scales to develop interventions that enhance communities' resilience.

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**Resilience is defined in the National Disaster Resilience Strategy as:**

*The ability to anticipate and resist the effects of a disruptive event, minimise adverse impacts, respond effectively post-event, maintain or recover functionality, and adapt in a way that allows for learning and thriving (NDRS, 2019, p.9).*

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To track our progress toward achieving this priority, the New Zealand Government funded the creation of a resilience assessment tool.<sup>1</sup>

The desired resilience assessment tool needed to be:

- Capable of assessing disaster resilience at the sub-national level for all areas of New Zealand
- Repeatable (i.e., based on a consistently available set of measures)
- Sustainable for small and large communities (i.e., not cost or time prohibitive)
- Useful for tracking variations in disaster resilience between places and over time

As a result, a composite indicator methodology was selected as the basis for the resilience assessment tool. Composite indicators are formed by compiling a set of indicators that capture different aspects of a multi-dimensional concept (e.g., resilience) into a single index.<sup>2</sup>

Indicator selection for what has come to be known as the New Zealand Resilience Index (NZRI) was informed by New Zealand's national and international resilience strategies, the National Disaster Resilience Strategy (The Strategy) and the Sendai Framework for Disaster Risk Reduction, as well as international peer-reviewed literature exploring resilience theory and practice across numerous contexts. This review supplied a framework for the dimensions of resilience the NZRI should capture.

Determining the purpose, focus, and measurement parameters for the NZRI was a multi-step process, described in-depth in Stevenson et al. (2018). This short report focuses on the way the literature on resilience was systematically analysed to operationalise the complex social phenomenon of resilience into a set of observable components that can be consistently measured.

The first step in the creation of a composite indicator is to establish a clear theoretical framework. The theoretical framework shows which dimensions of resilience will be measured, how various dimensions relate to each other, and helps determine the criteria for the underlying variables of the index (Nardo et al., 2008). In our assessment of community disaster resilience, we examine the phenomenon of community disaster resilience as several linked dimensions. First, we break resilience down into seven community "capital" domains. Then, we identify a number of key "concepts" that capture the processes, assets, or characteristics that create resilience in communities. This leads to the specification of indicator "metrics" that can be used to observe and

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<sup>2</sup> See Stevenson et al. (2015) for a critical analysis of other types of available resilience assessment tools and Stevenson et al. (2018) for a more in-depth discussion of the composite indicators for resilience.

measure those resilience processes in New Zealand’s communities. These indicators have been combined into a bank (the Indicators Bank).

## Indicators Bank Overview

For the NZRI, the indicator selection process began with an extensive review of international approaches to measuring, monitoring, and evaluating resilience. This review led to the development of an Indicators Bank database with a row for each identifiable item used to assess dimensions of community resilience in published resilience assessment surveys, composite indices, scorecards, and components of computational modelling frameworks. See Appendix 1 for a complete list of assessment tools and indicator summaries included in the Indicators Bank.

In total, the resilience Indicators Bank database includes:

- Indicator items from 32 resilience assessment tools or indicator reviews
- 1,684 items (resilience indicators)
- Coded assessments of each item, noting:
  - The community capital with which the item is associated
  - The resilience concept captured by the item
  - Whether the item captures information relevant to a special interest community (e.g., indigenous people, rural communities, people with physical or medical disabilities)

## Coding the Indicators Bank

Each of the 1,648 items within the Indicators Bank was coded using a two-step content analysis approach. First, binary (0, 1) codes were used to note whether the item fell into several pre-defined categories. The pre-defined categories were based on the community capitals theoretical framework described below. Then, the items were qualitatively analysed for consistently emerging themes, which we refer to as ‘resilience concepts’. These resilience concepts were repeatedly refined to minimise overlap and ensure consistent application. A complete codebook of resilience concepts and definitions is provided in Appendix 2. Once the qualitative codebook was created, the entire Indicators Bank was then recoded using a final set of resilience concept codes.

## Resilience Capitals

The Community Capitals Framework (CCF) offers an approach to understanding and measuring change within and across the interlinked systems that make up human communities (Emery & Flora, 2006). The CCF is a theoretical and analytical tool designed to show assets across a range of distinct “community capitals” that define the stocks and flow of resources within a community (Emery & Flora, 2006; Flora, Flora, & Fey, 2004).

The CCF was part of the foundational work on the Sustainable Livelihoods (SL) Framework developed initially by the Department for International Development (UK). The SL Framework and associated approaches sought to address the structural conditions that underlie pressing social issues (e.g., poverty) through assessments and interventions that recognise the interactions and inseparability of environmental, social, economic, and institutional aspects of societies (Ashley & Carney, 1999). In the CCF model there are seven different components of community capital: natural, cultural, human, social, political, financial, and built (Emery & Flora, 2006).

Each of these capitals contribute to the ability of a society to function, learn, and adapt in the face of disruption. We used these seven capital categories to organise the various aspects of resilience that assessment tools measure (Figure 1).



Figure 1: Community Capitals Framework used in the Resilience Indicators Bank database.

The National Disaster Resilience Strategy for New Zealand (The Strategy) uses a modified community capitals framework. The framework used in The Strategy captures the stocks and flows of different categories of resources within a community (Emery & Flora, 2006; Flora & Fey, 2004). Each of these capitals contribute to the ability of a society to function, learn, and adapt in the face of disruption.

These community capitals in The Strategy are referred to as resilience capitals and include; social resilience, cultural resilience, economic resilience, resilience of the built environment, resilience of the natural environment, and governance of risk and resilience. In this interpretation of the CCF, the human and social capitals are combined, resulting in six, rather than seven, capitals.

For the sake of creating categories that were clear and mutually exclusive, the pre-defined coding scheme used for the Indicators Bank used the seven-capital model. The following definitions for each capital guided the binary coding.

- **Built capital** indicators refer to physical engineered structures and systems, such as buildings, roads, utility distribution networks, machinery and the systems designed to support and administer those physical infrastructures. Built capital functions to shelter and transport people, goods, and services in a way that enables social and economic functions.
- **Cultural capital** refers to the values, symbols, practices, and assets that are reflected in the arts, heritage, and customs and associated practices, items, and structures.
- **Economic capital** refers to the financial resources of people, households, communities, businesses, and institutions. It also refers to the methods or practices that allow for the retention and growth of financial resources.
- **Environmental capital** refers to the 'natural' features and resources of a place such as landscapes, mountains, lakes and rivers, flora, and fauna.

- **Human capital** is the proficiency that is either intrinsic or obtained within a human population.
- **Social capital** refers to the features of social organisation that allow populations to function collectively, including cultural norms, trust, and networks.
- **Institutional capital** refers to the rules, activities, and structures that guide and govern social and economic functions.

Many of the resilience assessments included in the Indicators Bank were not developed within the context of the community capitals framework. As a result, indicator items may capture more than one capital domain.

As a general set of guidelines, indicators of built environment resilience capture the exposure, robustness, redundancy, resourcefulness, and capacity for rapid resumption of the built environment and the critical functions it serves. Indicators of cultural and economic resilience reflect the ability of cultural values and assets, including meanings placed on places and artefacts, customs, habitual practices, and significant landscapes to mitigate the adverse impacts of a disaster, optimise opportunities, and respond and recover effectively. Indicators of environmental resilience include attributes of the natural environment that reduce the exposure of people and property to the adverse effects of disasters. They also include the practices that enable the management and enhancement of environmental capital. Human capital enables the behaviours and actions that allow human populations to reduce the negative impacts of disruptions and maximise positive outcomes. Social resilience indicators capture the capacities of individuals, households, and place-based communities to mitigate the adverse impacts of a disaster, optimise opportunities, and respond and recover effectively. Indicators of institutional resilience are intended to capture the capacity of institutions to govern in a way that facilitates the resilience of the other capital categories; to learn and adapt in a way that maintains the resilience of the other capital categories (i.e., all other segments of society under their jurisdiction).

## Resilience Concepts

Items in the Indicators Bank were also qualitatively analysed for consistently emerging themes, for aspects of resilience that are relevant to New Zealand, and concepts that could feasibly be measured quantitatively even if the data is not readily available right now. In total, we identified 66 resilience concepts that capture separate aspects of community resilience across the tools included in the Indicators Bank (Appendix 2). If more resilience assessment tools are included in the future, concepts may be added. Similarly, while efforts were undertaken to clearly define and apply the concept codes, a different analyst may have categorised the items differently. Additionally, the concepts do not necessarily reflect items that had the greatest influence on resilience outcomes, but concepts that were evaluated in the tools included in the Indicators Bank database.

Some resilience concepts appear in the Indicators Bank repeatedly, while others are less common. For example, there are 86 items in the Indicators Bank that attempt to capture “policy, legislation, and plans for DRR and resilience”, 82 items that measure “household and community economic health”, and 73 that refer to the “education, knowledge, and skill level” of the population. There are only 4 items that are designed to reflect “change of land use or land cover”, 4 items that reflect whether the natural “environment is understood and valued by the population and/or government”, and 3 items that refer to “public institutions’ economic health”. We attempted to create resilience concepts that had similar conceptual breadth so large numbers of items were not included or excluded in a concept due to over- or under-specification of the terms. Still, the frequency of each concept in the indicator bank is only meaningful in that it reveals how often such concepts were included in various resilience assessments. Frequency does not necessarily mean that a concept is more important or likely to influence resilience outcomes. Therefore, it is important to use these

concepts as a guide to how resilience might be assessed rather than as a definitive list of how resilience is understood and enacted.

The Indicators Bank can and has been used as a general database for those interested in the ways resilience has been measured in different contexts. The full Indicators Bank can be made available for research purposes upon request. It must be noted, however, that although we attempted to include as many documented sources of resilience assessments as possible, we did not apply a comprehensive systematic literature review approach to the accumulation of sources. As a result, we cannot claim that the Indicators Bank is a comprehensive representation of community disaster resilience measures in New Zealand. Additionally, the addition of new indicators ceased in mid-2018. As a result, there are likely new indicators available or updates to existing tools that should be considered in future iterations of the Indicators Bank.

## **Resilience Indicator Metrics**

One of the most significant challenges of composite indicator construction is translating intangible resilience concepts into indicator metrics that can be consistently observed and measured. We used the resilience concepts developed in the Indicators Bank to guide the types of metrics we considered for the NZRI.

The 66 resilience concepts classified by community capital and suggested observable indicator metrics for each concept can be found in Appendix 3. The metrics were written to be both conceptually and culturally relevant and measurable within a New Zealand context. The indicator metrics are drawn from both items included in the indicator bank and knowledge of items that are relevant in a New Zealand context. In the specification of suggested indicator metrics we also took into account whether datasets are or are likely to become publicly available. The list of metrics is not comprehensive, and will need updating in the future.

## **Contact Details**

For further information on this document, or to request access to the full indicators database, please contact Ellie Kay, Resilient Organisations Ltd., ([ellie.kay@resorgs.org.nz](mailto:ellie.kay@resorgs.org.nz)).

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## Appendix 1: Tools Reviewed in the Indicator Bank

Some resilience assessment tools were developed to be applied by an international audience (e.g., ARUP’s City Resilience Index and the UNISDR’s Disaster Resilient Scorecard for Cities), while others were developed in a national or subnational context (e.g., Australian Natural Disaster Resilience Index and the localised disaster-resilience index for coastal communities in the Philippines). In addition to indicators included in complete resilience assessments, the Indicators Bank also includes cross-case analyses of resilience assessments presented in “Persistent variables found in case studies of community resilience” (Cutter, 2016) and an extensive list of the indicators that were considered for resilience assessment in the development of the well-known Baseline Resilience Indicators for Communities (BRIC) (Burton, 2014; Cutter, Burton, & Emrich, 2010). In many cases the Indicators Bank includes items that were discussed as part of the construction of the final assessment tools. These include items that either could not be included due to lack of data availability or condensed in later iterations of the tool.

Two tools were included that have important connections to resilience assessment but were not explicitly developed to measure disaster resilience – the Canterbury Wellbeing Index (CERA, 2004) and the Indigenous Health Indicators Tool which is part of the US Climate Resilience Toolkit (EPA, n.d.). Additionally, tools were included that focus on a specific aspect of community resilience, such as infrastructure functionality or economic resilience.

The references included in the table below capture the location of relevant indicator lists and further explanations of the measurements. In the Indicators Bank, we have also tried to note where authors directly cross-referenced their selected indicators to other works. For example, Irajifar (2016) are explicit about their use the same indicator wording and justification for a sub-set of their indicators as Cutter et al. (2010), Mayunga (2009), and others. As a result, in the full Indicators Bank (available upon request) notes next to these indicators reference other sources that may be relevant references for that indicator.

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|--|---|
| A Basket of Indicators of Economic Resilience            | Ranger, N. & Surminski, S. (2013). Disasters and their economic impacts: Disaster Resilience and Post-2015 Development Goals: The Options for Economics Targets and Indicators. In Mitchell, T., Jones, L., Lovell, E., & Comba, E. (Eds). Disaster risk management in post-2015 development goals: potential targets and indicators. Overseas Development Institute (ODI).   |
| Australian Natural Disaster Resilience Index             | Parsons, M., Glavac, S., Hastings, P., Marshall, G., McGregor, J., McNeill, J., ... Stayner, R. (2016). Top-down assessment of disaster resilience: A conceptual framework using coping and adaptive capacities. International Journal of Disaster Risk Reduction, 19, 1–11. <a href="https://doi.org/10.1016/j.ijdr.2016.07.005">https://doi.org/10.1016/j.ijdr.2016.07.005</a> .  |
| Canterbury Wellbeing Index                               | Canterbury Earthquake Recovery Authority. (2014). Canterbury Wellbeing Index June 2014. Christchurch: Canterbury Earthquake Recovery Authority.   |
| Capacities for Community Resilience                      | Sherrieb, K., Norris, F. H., & Galea, S. (2010). Measuring capacities for community resilience. Social indicators research, 99(2), 227-247.   |
| Characteristics of A Disaster-Resilient Community (CDRC) | Twigg, J. (2009) Characteristics of a Disaster-Resilient Community. A Guidance Note. Available at: <a href="http://discovery.ucl.ac.uk/1346086/">http://discovery.ucl.ac.uk/1346086/</a> .  |
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| Coastal Resilience Index: Community Self-Assessment      | Sempier, T. T., Swann, D. L., Emmer, R., Sempier, S. H., & Schneider, M. (2010). Coastal Resilience Index: A Community Self-Assessment Understanding how prepared your community is for a disaster (No. MASGP-08-014). Retrieved from <a href="http://masgc.org/assets/uploads/publications/662/coastal_community_resilience_index.pdf">http://masgc.org/assets/uploads/publications/662/coastal_community_resilience_index.pdf</a>                   |
| Communities Advancing Resilience Toolkit (CART)          | Pfefferbaum, R., Pfefferbaum, B., & Van Horn, R. (2011). Communities Advancing Resilience Toolkit (CART): The CART Integrated System. Oklahoma City, OK.  |
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|  | United Nations Development Program. (2017). Graphics for FGD Section 3 Scoring (Community-Based Resilience Analysis (CoBRA) Implementation Guidelines: Version 2). Retrieved from <a href="http://www.undp.org/content/undp/en/home/librarypage/environment-energy/sustainable_land_management/CoBRA/cobra_guide.html">http://www.undp.org/content/undp/en/home/librarypage/environment-energy/sustainable_land_management/CoBRA/cobra_guide.html</a> |
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|--|---|
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| Cumulative Adaptive Capacity Index (for Climate Change in Sri Lanka)         | Thathsarani, U. S., & Gunaratne, L. H. P. (2018). Constructing and Index to Measure the Adaptive Capacity to Constructing and Index to Measure the Lanka Adaptive Capacity to Climate Change in Sri Lanka. <i>Procedia Engineering</i> , 212(2017), 278–285. <a href="https://doi.org/10.1016/j.proeng.2018.01.036">https://doi.org/10.1016/j.proeng.2018.01.036</a>    |
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| Localized disaster-resilience index (coastal communities, Philippines)       | Orencio, P. M., & Fujii, M. (2013). A localized disaster-resilience index to assess coastal communities based on an analytic hierarchy process (AHP). <i>International Journal of Disaster Risk Reduction</i> , 3(2013), 62–75. <a href="https://doi.org/10.1016/j.ijdrr.2012.11.006">https://doi.org/10.1016/j.ijdrr.2012.11.006</a>                                   |
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## Appendix 2: Resilience Concept Definitions from Indicators Bank Code Book

| CAPITAL  | RESILIENCE CONCEPT  | DEFINITION  |
|----------|---|---|
| Built    | Building stock exposure   | The amount or proportion of buildings/structures exposed to damage because of a hazard. Potential amount of loss or cost of repair.   |
| Built    | Building stock redundancy/ sheltering capacity  | Vacant or available building capacity. Number of beds, rooms, buildings available for post-disaster mobilisation or relocation.   |
| Built    | Building stock robustness/ responsiveness/ adaptability   | The quality of the existing building stock. Often includes references to years of construction, construction materials, capacity of buildings to retain function following a disruptive event.  |
| Built    | Evacuation enabling infrastructure  | Infrastructure (roads, bridges, airports) that can enable evacuation or movement of people and goods before or after a disruptive event. Includes references to risk of community isolation.  |
| Built    | Infrastructure that enables access to resources and critical services                               | Infrastructure (roads, bridges, airports, infrastructure to support public transport) that enables access to the resources and services communities need to function socially and economically. Includes references to average travel times to critical resources and services. |
| Built    | Lifeline utility exposure   | The amount or proportion of lifeline utilities or service exposed to damage or loss of functionality because of a hazard. Potential amount of loss or cost of repair.   |
| Built    | Lifeline utility robustness/ redundancy/ responsiveness/ adaptability                               | The quality of the existing lifeline utilities, the capacity to absorb disruptions, retain functionality, recover quickly, or find alternative ways to deliver critical services to populations.  |
| Built    | Protective infrastructure   | Existence, quality, or maintenance of structures designed to protect people and assets from hazard disruption or losses. For example, stop banks and flood ways.  |
| Cultural | Integration of indigenous or traditional knowledges into planning, policy, and legislation          | The intentional integration of indigenous or traditional knowledges into planning, policy, and legislation.   |
| Cultural | Maintenance/ preservation of cultural resources, traditional knowledge/practices/ language, history | Efforts to retain, maintain, or preserve cultural resources, traditional knowledge/practices/language, history including programmes, spending, practices and behaviours.  |
| Cultural | Provision of cultural assets/resources  | Institutions or community members/ organisations supply the resources, assets, and other support for cultural activities including arts, entertainment, museums, event spaces, and historic sites.  |
| Cultural | Sustainability and vibrancy of culture  | Evidence that indigenous culture/knowledge, heritage, and arts are adequately funded, engaged by the population, and/or are likely to endure.   |



| <b>CAPITAL</b> | <b>RESILIENCE CONCEPT</b>                                  | <b>DEFINITION</b>   |
|----------------|--|---|
| Economic       | Affordability/availability of important resources/services | Resources that are important to people's health or ability to socially or economic function are available and affordable to the community. This includes lifeline utilities such as fuel, electricity, and transportation.  |
| Economic       | Business community health                                  | Capacity of business community or local economy in an area to absorb disruptions, respond and recover quickly, and adapt before and after a disaster. Includes references to businesses' resource levels/financial status, access to credit and finance, diversity of business types, exposure to shocks. |
| Economic       | Business community planning and preparedness               | Businesses proactively engage in planning, preparedness, risk reduction, and mitigation activities.   |
| Economic       | Economic equity  | The degree of disparities in income or economic opportunities and efforts to minimise or address inequity.  |
| Economic       | Economic exposure  | The number/proportion of businesses, capital/assets, and livelihoods exposed to losses because of a hazard. Potential amount of loss or cost of recovery.   |
| Economic       | Food security  | Reliable access to enough food/nutrition. Security of food supplies and food distribution networks in a crisis.   |
| Economic       | Household/ community economic capital/power                | Ability of the population to manage, control, retain, and benefit from their capital or assets. Often captured as home ownership, security of land tenancy, or local ownership of businesses, capital, and assets.  |
| Economic       | Household/community economic health                        | Capacity of the population to economically absorb disruptions, respond and recover quickly, and adapt before and after a disaster. Includes references to household resource levels/financial status, access to credit and finance, diversity of income sources, exposure of livelihoods to shocks.       |
| Economic       | Housing availability/ affordability/ cost of living        | Cost, affordability, and availability of housing to buy or rent. Median/mean value of homes in an area.   |
| Economic       | Insurance saturation/ coverage                             | Availability/affordability, rate of uptake, and adequacy of coverage for household or commercial insurance.   |
| Economic       | Labour-force capacity/ Employment                          | Employment rate or labour-force participation rates of population subgroups (e.g., women, youth).   |
| Economic       | Macro-economic health                                      | Regional, national, or general market-level indicators of the economy's capacity to absorb shocks, respond and recover quickly, and adapt before and after a disaster.  |
| Economic       | Public institutions economic health                        | Financial position of public (government) institutions/organisations/agencies to absorb shocks, respond and recover quickly, and adapt before and after a disaster.   |
| Environmental  | Change of land use/land cover                              | The amount or proportion of an area that has changed from one type of land use, land cover, or land classification type to another in a given period of time. Often used to indicate loss of natural environments that provide buffering capacity to populations.   |
| Environmental  | Drinking water quality/ quantity                           | Quality and availability of drinking water to population.   |

| <b>CAPITAL</b>            | <b>RESILIENCE CONCEPT</b>  | <b>DEFINITION</b>  |
|---------------------------|--|--|
| Environmental             | Environment understood/valued by population/ government  | Indicators that the community and/or government understands and/or values the natural environment and the functions or services it provides the community.   |
| Environmental             | Environmental management practices for sustainability/disaster or climate resilience/ mitigation | Environmental management practices or policies promote or maintain the sustainability of development practices and account for the natural environments role in allowing the community to absorb, mitigate, and recover from climate and disaster event impacts.                           |
| Environmental             | Hazard exposure  | The degree to which the population or natural environment is exposed to the negative effects of climate change or disaster events, including immediate losses and degradation of function.   |
| Environmental             | Land use classification  | Information on land cover and the types of human activity involved in land use. Includes residential and commercial development density and the urban/rural profile.   |
| Environmental             | Natural resource availability and health   | The availability and health (sustainability, amount of degradation, quality) of natural resources including air, soil, biodiversity, vegetation levels, and other relevant environmental/natural resources.  |
| Human capital             | DRR and emergency knowledge/ training/ preparedness  | The degree to which individuals, households, and communities have knowledge about, training in, and have conducted preparedness or mitigation activities for emergencies, hazards, and disaster risk reduction. This includes references to previous experience of disasters.              |
| Human capital             | Education, knowledge, & skill level  | The general knowledge, skills, and levels of education held by individuals or households.  |
| Human capital             | Need for special assistance  | Populations needing help to complete core tasks or populations that will need special assistance in an emergency. This includes people with disabilities or who are otherwise infirm and institutionalised populations.  |
| Human capital             | Physical and mental health (wellbeing)   | The physical and mental health of the population including their general ratings of life quality and life satisfaction. Also includes references to rates of health promoting or health degrading behaviours (e.g., smoking).  |
| Human capital             | Speaks dominant language (English)   | Speaks the official language or language most commonly-used by official sources of information.  |
| Institutional/ Governance | Early warning and DRR communications/ information dissemination                                  | Funding, practice/active use, and maintenance of hazard early warning systems and other disaster risk reduction, response, and recovery related communication and information dissemination. Includes references to the proportion of population covered by/ able to access these systems. |
| Institutional/ Governance | Effort to assess, understand, record risks   | Public organisations/agencies fund, support, and conduct assessments of disaster risks and use risk information in decision making where relevant.   |

| <b>CAPITAL</b>               | <b>RESILIENCE CONCEPT</b>  | <b>DEFINITION</b>   |
|------------------------------|--|---|
| Institutional/<br>Governance | Health services/ medical care capacity   | The availability of health and medical services, practitioners, and facilities. Institutional funding and support for health services, and capacity of population to access these services.   |
| Institutional/<br>Governance | Institutional character - capacity to adapt, learn, innovate   | Practices and policies that show government/public organisation ability to adapt, learn, and innovate.  |
| Institutional/<br>Governance | Institutional character - cross-agency networks, mutual aid agreements, collaborative planning               | Government/public organisations work collaboratively with or establish networks and agreements with other organisations, communities, or regions to improve the flow of information and resources during business as usual and during and after crises.                             |
| Institutional/<br>Governance | Institutional character - preparedness, professionalism, resilience of emergency services/emergency managers | Emergency services or DRR and emergency management practitioners' level of training, preparedness, professional certification, and maintenance of skills.   |
| Institutional/<br>Governance | Institutional character - resilience of critical government/ administration functions                        | The resilience of government/ public organisations and ability to reduce the negative impacts of a disruption and continue delivering critical government and administrative functions in case of a disruption.   |
| Institutional/<br>Governance | Institutional character - transparency, accountability, inclusiveness  | Practices of government/public organisations to ensure transparency, public accountability, and inclusiveness of all segments of the population in decision making and delivery of services. Processes in place to review/ promote transparency, accountability, and inclusiveness. |
| Institutional/<br>Governance | Policy, legislation, and plans for DRR and resilience  | The existence, quality, relevance, and implementation of hazard, disaster risk reduction, and resilience policy, legislation, and plans, including hazard zoning, building codes, climate change, and other relevant issues.  |
| Institutional/<br>Governance | Provision (or capacity to provide) DRR management (hazard information, preparedness, response, and recovery) | The existence or resourcing of disaster risk reduction, hazard and resilience management agencies, services, or actions. Includes actions taken by emergency managers to provide training, information, or services to the public.  |
| Institutional/<br>Governance | Provision of education, safety, and social support services  | Government support for/resourcing of education, safety (including fire, policy, courts etc.), and social support services for the population. Includes assessments of availability and access to these organisations.   |
| Institutional/<br>Governance | Provision of insurance and response/ recovery/ resilience financing  | Government/public sector/ or market provision of insurance and financing for disaster response, recovery, and resilience enhancements. Includes affordability/ availability of insurance.   |
| Institutional/<br>Governance | Public trust in government /governing institutions   | The level/ degree to which the public or segments of the population trust the government or specific public agencies and organisations. Public faith in the government/ governing institutions.   |

| <b>CAPITAL</b> | <b>RESILIENCE CONCEPT</b>  | <b>DEFINITION</b>   |
|----------------|--|---|
| Social         | Access to information/ communication services  | People's access to or ability to access information or communication services. Includes access to telephone, internet, newspapers, and other communication mechanisms. Includes access to hazard/disaster information before, during, and after disruptive events.  |
| Social         | Age structure  | Information about the distribution of various age groups of people within the population.   |
| Social         | Civic engagement   | Population engages with or is able and encouraged to engage with governance institutions by, for example, voting, attending meetings, serving on community boards. Degree of interaction between government/ public organisations and the population.   |
| Social         | Collective efficacy  | The capacity of the community to deliver on collectively held goals. The ability to act collectively to get things done in and for the community. Belief in personal and community resilience or resilience capacities.   |
| Social         | Community inclusion and equity   | Community's inclusiveness or efforts to engage all segments of the population, positive engagement/ interaction between different sub-populations, and equitable treatment and access to community resources.   |
| Social         | Community leadership capacity and external networks                                  | Existence of leaders/ leadership structures in the community. The capacity of the community to self-govern or self-manage before, during, and after crises. Networks and access to people, agencies, and resources that exist outside of the community and offer access to more information and resources.  |
| Social         | Community led DRR and resilience planning and action                                 | Community leadership or capacity to lead disaster risk reduction and resilience planning, training, mitigation, and response and recovery activities.   |
| Social         | Community participation/ engagement in DRR training, planning, mitigation activities | Public participation in or engagement with DRR training, planning, mitigation, or resilience building activities. Focus is on engagement with programmes/activities delivered by emergency managers and other. Excludes measures of personal and household disaster knowledge, level of training already attained, household plans in existence etc, which is captured in Human Capital concept "DRR and emergency knowledge/ training/ preparedness" |
| Social         | Crime/ anti-social behaviour   | The amount of crime or anti-social behaviour in a community. Feelings of safety and security in the community.  |
| Social         | Demographics (other)   | Population distributions of gender/sex, population/population trends, ethnicity/race, marital status  |
| Social         | Generalised trust  | The existence or degree of trust within and among community members.  |
| Social         | Household composition  | The number/ distribution of different household composition types, including single parent families, lone person households, households with children.  |
| Social         | Local embeddedness - place attachment/place awareness                                | Population's length of residence, investment in, or attachment to their community. The degree to which the population understands or is aware of issues relevant to their community.  |

| CAPITAL | RESILIENCE CONCEPT  | DEFINITION   |
|---------|---|--|
| Social  | Mobility/proximity - means and access to resources/services/evacuation/sheltering | Population/household access to transportation or proximity of residences to resources, services, and, in case of a crisis, sheltering or welfare centres. Personal or household means to evacuate in case of a crisis.   |
| Social  | Social and community engagement   | Engagement or opportunities and encouragement of people to engage with others in their community. Participation in clubs, religious groups, and other networks including informal/interpersonal networks; people's sense of belonging in their community; access to supportive relationships/ social support. Includes counts of social/community or non-profit organisations. |
| Social  | Transient and seasonal populations  | Indicators that address issues specifically relevant to transient or seasonal populations.   |

# Appendix 3: Resilience Concepts and Metrics by Community Capital

The figures show data availability for each metric. The key associated with the following figures is shown in the top right hand corner.

**Data Availability Key**

- Metric included in NZRI (data already obtained)
- Data likely available from secondary source or calculable using available geospatial data
- Primary data collection likely needed





























