

Resilience Models/Frameworks

Type of Model/ Framework	Components	Characteristics	Potential Indicators	Author(s)
Resilience as a process	Resilience thought of not as an outcome but a sum of the processes which include: Broad scale community involvement; Programmes; Recognizing human role in disasters; Having disaster plans; Building capabilities; Sharing information; Purchasing insurance.	<ol style="list-style-type: none"> 1. Focused on recovery and 'bounce back-ability' 2. Proactive adaptation to risk (rather than only risk mitigation) 3. Acknowledges local knowledge and culture 	<ol style="list-style-type: none"> 1. Communities demonstrate awareness of actions to be undertaken when disasters strike. 2. High human development index 3. Effective platforms/structures for information sharing 4. Social, economic/political factors are considered in any action to increase resilience 5. Participatory tools are used in the formulation, implementation and evaluation of resilience programmes 	Manyena (2006)
Disaster Resilience of Place (DROP)	Antecedent conditions Inherent vulnerability Inherent resilience Hazard events Coping responses at the community level Capacity of the community to absorb the impacts Adaptive resilience (improvisation and learning)	<ol style="list-style-type: none"> 1. Diverse ecological factors combine to strengthen community resilience 2. Supportive social structures create an environment which makes a system more resilient 3. Economic 	<ol style="list-style-type: none"> 1. High biodiversity; low rates of erosion, high amount of wetland acreage 2. Large numbers of social networks; community possess cohesive values and opinions; presence of effective faith-based organisations 3. High rate of employment, consistent and equitable processes of wealth generation 4. High participation by 	Cutter et al. 2008

		<p>conditions lead to enhanced resilience in a system</p> <ol style="list-style-type: none"> 4. Institutions undertake actions that lead to increased resilience 5. Infrastructure is able to withstand natural hazards and still operate 6. The community is able to function well and understand risk. 	<p>communities in hazard reduction programmes and hazard mitigation plans; existence of building standards which reduce risk from natural hazards; existence of emergency response plans</p> <ol style="list-style-type: none"> 5. High level of functioning of critical infrastructure in the face of natural hazards; diverse and extensive transportation networks 6. High degree of understanding of risk amongst community; availability of counselling services, high degree of health and well-being. 	
Capital-based Approach	<p>Five types of capital can determine levels of resilience:</p> <p>Social Economic Human Physical Natural</p>	<ol style="list-style-type: none"> 1. The norms and networks lead to high degree of coordination and cooperation in the community; community members accessing resources. 2. Income, savings and investments lead to high capacity (e.g. insurance); fast 	<ol style="list-style-type: none"> 1. Large numbers of non-profit organisations, voluntary organisations, religious organisations, high level of voter participation and registration and newspaper readership, and sport and recreational clubs operating in the community. 2. Growing household income, property value and investment, stable and well-paying employment opportunities. 3. High levels of educational 	Mayunga, 2007

		<p>recovery process; high wellbeing and low poverty</p> <ol style="list-style-type: none"> 3. Education, health, skills, knowledge and information lead to high level of knowledge and skills to understand community risks; 4. High ability to develop and implement risk reduction strategy. 5. Housing, public facilities, industry lead to: effective communication and transportation, evacuation; increased safety 6. Resource stocks, land water and ecosystems lead to sustenance of all forms of life, increased protection, and protection of environment. 	<p>attainment, good health, low population density, good access to transportation service, good quality housing and low dependency ratio.</p> <ol style="list-style-type: none"> 4. Good quality and disposed housing units/ industry, shelter, lifelines and critical infrastructure 5. High quality air , water and soil, adequate degree of wetland and forest cover. 	
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Disturbance as opportunity	Diversity and individuality of components Nature of control mechanisms Number of functional groups and variability of responses to environmental change	<ol style="list-style-type: none"> 1. Leans to manage the change 2. Accept uncertainty 3. Interaction between system components is dispersed 4. Large numbers of functional groups which have variable responses to environmental change 	<ol style="list-style-type: none"> 1. Change in operation occurs based on learning, governance policies are continuously changing to reflect learning; components are changing and not static. 2. Policies reflect understanding of uncertainty 3. Evidence of each component interacting with each other with no centralization, policies and procedures do not follow a staged process but are iterative 4. Diverse actors with varied social/economic/political/ecological functions. 	Folke (2006)
Self-organising	The SES is broken into 4 constituent elements: Resource units Resource systems Governance systems users	Rather than characteristics of a resilient system, the following are characteristics which positively affect the likelihood of users self-organising to manage a resource: <ol style="list-style-type: none"> 1. Moderate territorial size 2. Certain amount of scarcity in a resource systems 3. Systems dynamics need to be 	Rather than indicators of a resilient system, these are indicators that will lead to systems users reorganizing: <ol style="list-style-type: none"> 1. Diminishing yields of produce from systems 2. Low cost of managing and monitoring a system 3. Effective knowledge amongst users of how the ecological environment will respond to activities within the system. 	Ostrom (2009)

		sufficiently predictable 4. Moderate amount of mobility in resource unit		
Disaster resilience indicators for benchmarking baseline situations	Social Economic Institutional Infrastructure Community capital	Percentage population with college education to the % population with no high school diploma; % of non-elderly population, with a vehicle, employed, etc.		Cutter et al. (2010)
A Model of resilience to hazard effects	Hazards effect High risk perception Low risk perception	Perceived community impact, problem focused coping, applied sense of community		Paton et al (2001)
Community resilience Model	Interactions as collective unit, expression of a sense of community and community action	Ability to cope with disasters, getting along, social networks, ability to cope with change, leadership, community problem solving, community togetherness, mentality outlook.		Kulig et al. (2008)