Resilience to Natural Disasters in Communities: A Literature Review

Alina Sánchez Chávez [1], Yadira Armas-Ortega [2],
Michael Camchong Ayón [3], Lisette Garnica-Jarrin [3]

[1] *Universidad de Guayaquil, Av. Delta s/n y Av. Kennedy, Guayaquil, Ecuador*
[2] *Universidad ECOTEC, Km. 13.5 Samborondón, Samborondón, Ecuador*
[3] *Universidad Bolivariana del Ecuador, Km 5 ½, via Durán, Durán, Ecuador*

Abstract **- Resilience is understood as the ability to overcome adverse events; therefore, catastrophe hazard decreases plans have paid consideration to communal resilience in recent decades because populations are extensively documented as the first community components disturbed and that respond when a natural catastrophe occurs. This paper reviews the literature using Biblioshiny to identify definitions, areas of study, and variables for measuring resilience from articles with the highest citations in the Scopus database. The search conducted shows that most authors agree on dimensions such as communal, monetary, communal investment, institutional, infrastructure, and ecological, while the variables that comprise each dimension are diverse, of which nearly two hundred have been counted. Among them, some are related and/or complementary, while others are different. By presenting these variables, this study aims to help public and/or private institutions consider them when developing the capacities of the local people.**

Keywords **- Resilience, community, dimensions, variables.**

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Corresponding author: Lisette Garnica-Jarrin,
Universidad Bolivariana del Ecuador, Km 5 ½, via Durán, Durán, Ecuador
Email: lmgarnicaj@ube.edu.ec

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1. Introduction

The nations of Latin America and the Caribbean (LAC) have been affected by natural phenomena that have caused disasters or catastrophes, the most frequent being meteorological and geological ones [1]. The Inter-American Development Bank (IDB) has estimated that, in the countries of the LAC region between 1980 and 2016, natural disasters caused 400 thousand deaths and generated 183 billion dollars in losses [2]. Furthermore, it is mentioned that 75% of its people, that is, about 480 million people, live in areas at risk of disasters. On the other hand, in the United States, annual losses owing to natural risks increased from $4.7 billion in the 1960s to $6.7 billion in the 1970s, growing to $7.6 billion for the following ten years from 1980, $14.8 billion in 1990 and $23.6 billion in 2000; estimating yearly wounded of around $30 billion in the ten years to 2010, that is, $300 billion projected within a single decade [3].

The United Nations (UN) established the United Nations Disaster Relief Office (UNDRO) in 1971, with its initial objectives primarily focused on providing immediate relief after disasters, rather than on disaster preparedness [4]. At the end of 1999, the UN accepted the United Nations International Plan for Disaster Risk Reduction and recognised the UNDRR, the secretariate responsible for confirming its implementation. This strategy emphasises resilience, identifying the essential to diminish the influence of catastrophes to decrease lack and attain expansion goals, as outlined in the 2005 Hyogo Agenda documents and later arranged in the 2015-2035 Sendai Agenda [5].

These Disaster Risk Reduction (DRR) initiatives not only involve direct tasks of management, mitigation, recovery and catastrophe attentiveness, but also connexion all parts of civilization, administration, professional and private sectors [6], [7], [8] in actions that contribute to the sustainability of development [9], [10].

DRR agendas have paid increasing consideration, particularly to communal resilience, because groups are extensively recognised as the primary communal units pretentious and responding when a catastrophe occurs [11], [12], [13]. In the United States, for instance, communal resilience has developed a central component of national safety and catastrophe administration strategy and arrangement. It has been positioned as a dangerous element of communal health. This preparation needs close association across dissimilar segments, groups, and enterprises with societies [14].

There are case studies [15], [16], [17]. These findings demonstrate, in general, that organised communities have a greater capacity to respond to disasters and initiate recovery processes than unorganised communities. Communities cope with earthquake recovery through their ability to address survival and planning issues, such as access to water, developing family and community plans to address psychological disorders, facilitating access to livelihoods and/or economic means, and coordinating with government entities and non-governmental organisations [18].

This research requests to contribute to the information by examining definitions, areas of study and variables for measuring community resilience to disasters caused by natural phenomena to recognise the factors that have contributed to the supple capacity of affected peoples, which will allow identifying elements that should be considered by local and national government institutions as well as non-governmental organisations for the preparation of people capacities at both urban and rural levels.

2. Materials and Methods

This analysis was led through a documented evaluation and the use of bibliometric tools, utilising the Scopus database as the primary search source. This platform provides access to bibliographic references of thousands of articles and scientific publications dating back to 1966 [19]. The documentary review revealed key definitions of the term resilience as it is used in various areas of knowledge. For the bibliometric study, keywords such as “community resilience indicators,” “community resilience factors,” “disaster resilience indicators,” “community disaster resilience measurements,” and “community disaster resilience” were used.

One hundred eighty-seven documents dating back to 2004 were obtained, however, until 2013 only 1 to 4 articles were published per year, and since 2014 more than 10 publications per year have been submitted, by 2023, 19 documents were collected, with 2019 being the year where the most significant number of contributions was obtained, with 30 contributions. This research includes information provided from 2004 to September 2023.

These contributions encompass a variety of document types, including articles, books, book chapters, conference papers, lecture notes, and other formats. Therefore, this study limited the information contained in the first three typologies, resulting in 136 publications. Through bibliometric systematisation, the primary authors, countries with the most publications, thematic areas, and keywords were identified. Finally, the published studies with the most citations were reviewed individually to examine the variables used for measurement and the dimensions or research areas involved in the metric.

3. Results

By applying bibliometrics, it is possible to create a word graph, known as a text cloud, a priori, which reveals the frequency of usually used positions and their comparative occurrences inside a given background. The more recurrent a term is in the texts, the larger it appears; as shown in Figure 1, the most frequent words are disasters, disaster management, disaster planning, resilience, risk assessment, human, psychological, climate change, resilient communities, social capital, among others.

Figure 1. Word cloud from the bibliometric results of the 136 selected documents

On the other hand, bibliometrics allows to see the countries that publish most frequently as well as the top ten authors who write the most about community resilience measurements, as shown in Figure 2.

The United States is the country with the highest number of publications (58), followed by Australia and China (14).

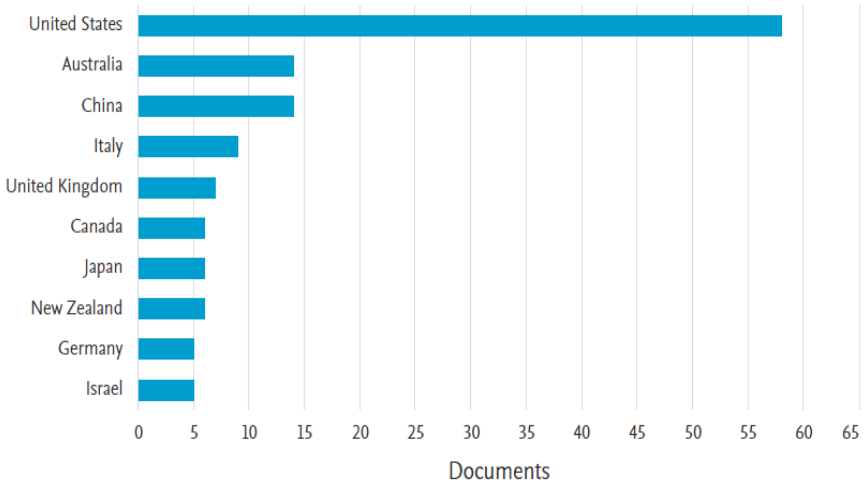

Figure 2. Countries with the highest number of publications

At the same time, Figure 3 presents the authors with the highest number of published studies, including Cutter (5), Becker (4), Goonetilleke (4), Johnston (4), Keating (4), Lam (4), Li (4), Patton (4), Qiang (4), and Saja (4).

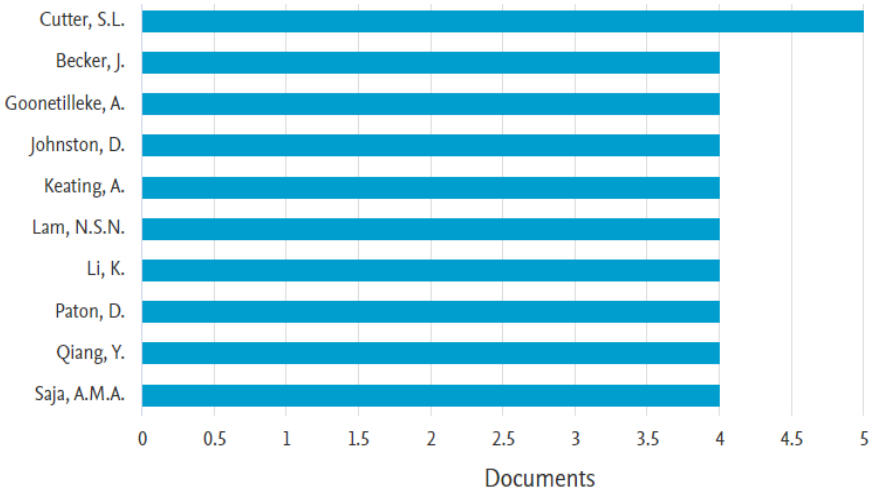

Figure 3. Authors of published studies

Figure 4 shows the areas of study that write about the indicated topic.

These include the following sciences: Social Sciences, Environmental Sciences, Earth and Planetary Sciences, Engineering, Medicine, Business, Management and Accounting, Psychology, Computing, Energy, Agriculture, among others.

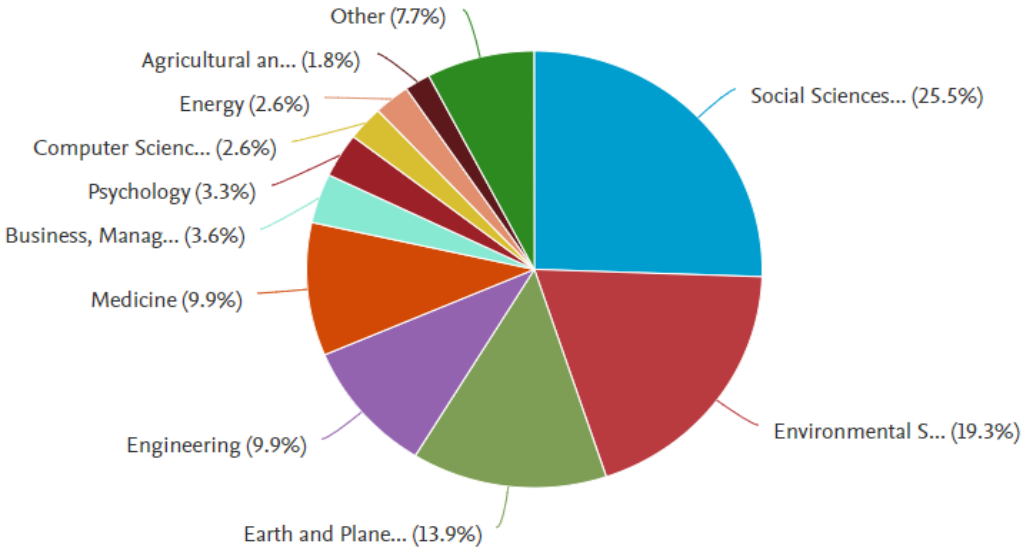

Figure 4. Study areas

This tool, through the thematic mapping option, outlines the most cited articles, author(s), year, journal, average citations per year, among others. Table 1 presents the ten articles with more than one hundred citations. The document titled "A place-based model for understanding community resilience to natural disasters", published by [20], has 2,455 citations, with an average of 153.44 citations per year, which proves to be the most cited article. In the following positions, the author Cutter appears alongside two other publications from 2014 and 2016, which have garnered 613 and 427 total citations, placing them in second and fourth place, respectively.

Table 1. Most cited articles

No	Authors	Year	Total Citation	TC per year
1	[20]	2008	2455	153,44
2	[21]	2014	613	61,30
3	[22]	2010	459	32,79
4	[23]	2016	427	53,38
5	[24]	2014	243	24,30
6	[25]	2015	243	27,00
7	[26]	2016	133	16,63
8	[27]	2016	133	16,63
9	[28]	2013	129	11,73
10	[29]	2016	114	14,25

3.1. Main Definitions and Elements

From these most cited articles, the definitions of adaptability, community, dimensions and variables considered in community adaptability measurements will be regarded; [20] point out that adaptability is the capability of a communal structure to reply and recuperate from catastrophes and contains those characteristic situations that certification the structure to engage influences and accomplish with an occurrence, as well as post-event supple procedures that simplify the capacity of the community structure to reorganise, modification and study in reply to a risk.

While the term 'community' is used by [21] to refer to an area rather than examining interactive exchanges between inhabitants, organisations, or further entities. Another term included in these studies is social capital, which refers to the set of supple capabilities that can sustenance the procedure of communal resilience to preserve and support communal well-being, measured with aggregate variables that have connotation only for the locality or proximity, such as the attention of public organisations in a given geographical area. It incorporates three components: (a) Community assistance, (b) Community contribution, and (c) Communal connections [22], [30].

Among the most common elements in various approaches to measuring community resilience, they can be categorized into characteristics and resources, including monetary, community, ecological, and structure aspects, as well as capabilities such as community centre, communal purposes, connectivity, and development. The most significant connexion of variables in the situation findings occurs in the category of social capital. These metrics are based on factors such as religious affiliation, the presence of civic organisations, and access to healthcare, which is reasonable by the number of physicians [23]. On the other hand, by fostering the cohesion of community advise organisations and facilitating to construct robust associations, the efficiency of reply and recovery from natural catastrophes is improved [27].

This is partly since there are insufficient unequivocal sets of measures in the information that describe how to quantity and comparison societies in positions of their adaptability. Neighbourhoods that can intensification their adaptability are better able to survive difficulty and recuperate more speedily when harmful threat proceedings befall.

Most of the investigation highpoints a series of phases that incorporate recognising pertinent variables, performing multivariate investigation, aggregating data, and connecting variables to an outward corroboration metric [25]. Community resilience requires original, interdisciplinary, systems-based methods that rely on many punishments, comprising production, community and monetary knowledges, and evidence technology [26].

In this context, the National Institute of Standards and Technology (NIST) established the Community Resilience Planning Guide in 2015 [31]. To be adopted by communities in the United States, it also created the Center of Excellence for Risk-Based Community Resilience to understand how a community becomes resilient. To this end, it operates along three lines, one of which involves structuring resilience data through test benches and retrospective analysis, with integration into computational modelling and decision-making algorithms.

3.2. Identification of Dimensions and Variables

In identifying variables and dimensions, similarities were found in the number of dimensions, as most group them into six approaches: ecological, social, infrastructure, institutional, economic, and community capital. However, the names are used with related terminology, such as with the ecological component. Some authors refer to it as environmental systems, while others refer to it as ecological. Regarding social grouping, some authors call it human; with infrastructure, some refer to it with this name, but others use the term physical.

Regarding economic grouping, some retain this name, but others use the term economic development - while the community capital dimension, some authors refer to it as social capital or community competence. It is also evident that authors place similar variables between the social component and community capital, such as medical and educational equality, among others.

Regarding the variables, each author proposes different indicators. An attempt has been made to find common ground, but when they are declared with specific terms or because the opposite is true, they are not unified. For example, if the variable refers to the percentage of impermeable surface, another author refers to the rate of permeable surface. Although they are essentially referring to permeability, some authors are interested in measuring permeability, while others are interested in the opposite. Therefore, some authors point out that the variables in the measurements are either positive or negative.

One hundred ninety-two variables have been identified, grouped into the six aforementioned dimensions, which are presented in Table 2. The ecological area, also known as environmental systems, includes variables 1-26; the social category, or labelled as human, contains variables 27-60; the economic element, or economic development, presents items 61-95; and the group described as institutional includes variables 96-126. The area of study of infrastructure or physical shows 127-161, and community capital or community competence, or also recognised as social capital, groups from 162 to 192.

Table 2. Identification of variables for community resilience

Categories	**Metric**
Ecological	1) Swamp area and harm, 2) Destruction proportions, 3) Biodiversity, 4) # of coastal defence structures
Ecological/Physical	5) % impervious/permeable surface
Ecological	6) Local food suppliers, 7) Natural flood buffers, 8) Energy efficiency, 9) Water efficiency
Environmental Systems	10) % of property area that does not comprise erodible lands
Environmental Systems	11) % of property area that is not in a flood zone (100/500-year flood and tempest flow collective), 12) % of property space that is undeveloped forest, 13) % of property area with no decrease in wetland
Environmental Systems	14) % of property area that is not in high-incidence landslide zones
Environmental Systems	15) Number of river miles
Environmental Systems	16) % of property area with no change in property cover or use, 1992–2001, 17) % of cultivated property area that is arable
Environmental Systems	18) % of property area under protected status
Environmental Systems	19) % of property area consisting of windbreaks and environmental protection, plantations, 20) % of property area that is wetland, everglade, fenland, mangrove, soil, mound or natural block.
Environmental Systems	21) % of property area developed as open space.
Environmental Systems	22) Frequency of weather events causing losses (hail, wind).
Environmental	23) Total space of green structure per square mile, 24) Average number of pouring times, 25) Standard number of days with rainfall greater than 80 mm/day, 26) Average elevation.
Collective	27) Demographic data / Pre-retirement age.
Collective	28) Social networks and social roots, 29) Communal values-consistency.
Collective	30) Religious establishments.
Collective	31) Equality in educational achievement
Collective	32) Transportation (% households with at least one car, % people with access to vehicles).
Collective	33) Communication skills (% Households with telephone), 34) English language proficiency (% people that does not speak English as a second language), 35) non-special needs / % people without disabilities.
Collective	36) Health insurance, 37) Food supply capacity
Collective	38) Mental health support / Psychosocial support services per 1,000 inhabitants
Collective	39) Medical access
Collective	40) Learning Equivalence: % more than high institute, 41) Educational Equality: % variance in less than high school among African Americans and whites, 42) Educational Equality/% less than high school, 43) Educational Equality: % with BA/% exclusive of high school or GED
Collective /Human*	44) Educational equality: % with a high school diploma and/or % less than a high school diploma
Collective /Human*	45) % of the people that is not elderly or % of the people over 65 years of age
Human	46) % women, 47) % single-person households, 48) Disaster Managers per capita
Collective	49) % of the people that is not institutionalized or sick
Collective	50) % of the people that is not a minority
Collective	51) % of the people living in high-intensity municipal spaces
Collective	52) Social support plans per 1,000 inhabitants, 53) Adult teaching and schooling plans per 1,000 inhabitants.
Collective	54) Childcare plans per 1,000 inhabitants.
Collective	55) Communal assistances (entertaining amenities, gardens, historical locations, public library, galleries) per 1,000 inhabitants.

Collective	56) Internet, TV, radiocommunication and communications announcers per 1,000 inhabitants.
Collective	57) Health facilities per 1,000 inhabitants.
Collective	58) Justness Relationship % school grade and % without high university certificate.
Collective	59) Ratio of % subgroup people to % non-minority people.
Collective	60) Use of food stamps.
Economic	61) Employment/Employment-people ratio.
Economic	62) Property value, 63) Wealth generation, 64) Municipal finances/revenues.
Economic	65) Home ownership/% of owner-occupied homes.
Economic	66) Race/ethnicity income equality.
Economic	67) No dependence on the primary/tourism sectors, 68) Large geographic retail distribution - regional/national.
Economic	69) Gender income equality/Income equity.
Economic	70) Company size / Proportion of large and small companies.
Economic	71) Federal employment.
Economic development	72) Average family income.
Economic development	73) Doctors per 10,000 inhabitants / Doctors and medical professionals per 1,000 inhabitants.
Economic development	74) Corporate tax revenue/1,000, 75) Percent of creative class occupations, 76) Less than high school education: % African Americans to less whites, 77) Net business profit/loss ratio, 78) Urban influence.
Economic development	79) Occupational diversity.
Economic	80) Annual income, 81) Per capita income, 82) Wealthy retirees.
Economic	83) Household per capita income / Family per capita income.
Economic	84) % of working-age people that is employed, 85) % female labor force participation, 86) Ratio of % white homeowners to % non-white homeowners.
Economic	87) Average sales volume of companies.
Economic	88) % of people not employed in primary industries.
Economic	89) Shopping centers per 1,000 inhabitants, 90) % of commercial establishments outside high-risk areas.
Economic	91) Credit institutions per 1,000 inhabitants.
Commercial	92) Commercial infrastructure density.
Commercial	93) % Social Security income recipients, 94) Security budget per capita, 95) Disaster relief fund per capita.
Organised	96) Participation in Hazard Reduction Programs/Local Disaster Training, 97) Emergency Services, 98) Zoning and Building Regulations, 99) Emergency Response Plans, 100) Interoperable Communications, 101) Continuity of Business Plans, 102) Jurisdictional Coordination, 103) Disaster Relief Experience, 104) State Capital Response Regimes/Proximity of County Seat to State Capital, 105) Nearest Metropolitan Area Response Regimes/Proximity of County Seat to Metropolitan Area, 106) People Stability, 107) Nuclear Plant Accident Planning.
Organised	108) Hazard mitigation plans/Preparation of the risk mitigation plan.
Organised	109) Mitigation spending/10-year average of mitigation spending per capita, 110) Crop insurance coverage/Crop insurance policies/m2.
Organised	111) Overflow assurance reporting / % of households protected by the National Flood Insurance Program.
Organised	112) People (or %) covered by FEMA-permitted threat moderation strategy/% of people covered by a recent hazard mitigation plan, 113) FEMA Community Rating System (CRS) scores/% of peoples contributing in the Community Rating System (CRS).
Organised	114) Coastal setback, shoreline restoration, 115) Acquisition of flood-prone properties, flood protection, flood warning system, 116) Officials support vulnerability reduction, 117) Officials support vulnerability reduction, 118) Building codes.
Organised	119) % of people participating in the Citizen Corps program, 120) Number of disaster declarations paid.
Organised	121) % of the workforce employed in emergency services (fire, justice, protection).
Organised	122) % property cover change towards urban areas from 1990 to 2000.
Organised	123) Structural Disaster Mitigation Capacity Rate, 124) Non-Structural Disaster Mitigation Capacity Rate, 125) Preparation of Rainwater Runoff Reduction Plan, 126) Detention Centers Preparedness Plan.

Infrastructure	127) Lifelines and critical infrastructure: communications, power grid, bridges, wastewater, water, dams, 128) Commercial and manufacturing establishments.
Infrastructure	129) Transportation network, 130) More resistant types of housing.
Infrastructure	131) Residential housing stock and age/ Construction quality of the housing stock.
Infrastructure	132) Availability of temporary housing, 133) Medical care capacity, 134) Evacuation routes, 135) Availability of temporary shelter, 136) School restoration potential (public schools per 10,000 inhabitants), 137) Industrial resupply potential, 138) High-speed internet infrastructure.
Infrastructure	139) Crisis administration structures (fire stations, police, crisis procedures centre).
Infrastructure	140) Government/institutional buildings (city hall, schools, nursing), 141) Others (recreation and art centers).
Infrastructure	142) Adaptation of tourist facilities (own), 143) Green certifications for hotels and other tourist establishments.
Infrastructure	144) % of accommodation that is not a portable household, 145) % of accommodation not built before 1970; after 1994, 146) % of accommodation that is a empty rent unit, 147) Hotels and motels per square mile, 148) Institutes (primary and secondary schooling) per square mile, 149) Major miles, 150) Concentration of single-family detached homes.
Infrastructure	151) % firefighters, police, emergency relief services and temporary shelters outside of danger zones.
Infrastructure	152) Number of railway miles.
Infrastructure	153) Building infrastructure that is not subject to flooding or storm surge inundation, 154) % of building infrastructure that is not located in high erosion risk areas.
Infrastructure	155) Companies by sector, 156) Types of buildings constructed and occupancy, 157) Network of main and secondary roads, 158) Electric power system (generation, transmission and distribution).
Physical	159) Number of new constructions permits per square mile, 160) Number of dams, 161) Urban areas.
Community Competence	162) Local understanding of risk, 163) Counseling services, 164) Absence of psychopathology (alcohol, drugs, spousal abuse), 165) Health and well-being (low rates of mental illness, stress-related outcomes), 166) Quality of life (high satisfaction).
Communal Investment	167) Place attachment: non-recent immigrants, 168) Place attachment: native residents, 169) Citizenship skills for disaster preparedness and response.
Communal Investment	170) Political commitment/% of voting-age people.
Communal Investment	171) Religious organizations; Persons affiliated with a religious entity; Religious organizations per 1,000 inhabitants; 172) Civic organizations per 10,000 inhabitants.
Communal Investment	173) Disaster Relief Volunteering/Registered Volunteers per Capita.
Communal Investment	174) Voluntary organizations per capita, 175) Per capita budget for voluntary organizations.
Assign Investment	176) Ratio of 2-parent households with children to 2 parents, 177) Number of arts/sports organizations/10,000, 178) Net migration rate/1,000, 179) Property crime rate (inverse).
Assign Investment	180) Civic organizations (Kiwanis, Rotary) and political organizations, 181) Registered non-profit organizations, 182) Physicians/10,000, 183) Physicians, 184) Religious networks.
Assign Investment	184) Social defence organizations per 1,000 inhabitants, 185) % of people born in a state and still residing in that state.
Assign Investment	186) Arts, entertainment and recreation centers per 1,000 inhabitants.
Assign Investment	187) % of labour force working in specialised professions, 188) Qualified, scientific and methodical facilities per 1,000, 189) Investigation and progress corporations per 1,000 inhabitants, 190) % of people that is not an international migrant.
Assign Investment	191) Business and professional organizations per 1000 inhabitants.
Assign Investment	192) National Historic Register per square mile.

4. Discussion

The term resilience is approached with different criteria depending on the academic discipline or field of research. For example, in the area of Ecology, it is indicated that adaptability is a quantity of the perseverance of structures and their capacity to engross changes and disturbances and preserve the similar relations among peoples or national variables [32]. For the line of Environmental Economics, it is indicated that adaptability is a quantity of a structure's capacity to resist tensions and shockwaves; of its capacity to persevere in an indeterminate area [33], while in the field of Economic Sciences, adaptability is the competency of a structure to engross or pillow harm or loss, which incorporates dynamic considerations, comprising steadiness. It is the capacity of a structure to recuperate from a plain shudder [34], [35]. On the other hand, the UNDRR describes adaptability as the capacity of a structure, communal or civilisation uncovered to threats to repel, engross, familiarise to and recuperate from the possessions of a threat in an opportune and effectual means, counting finished the protection and refurbishment of its important elementary buildings and purposes.

As mentioned, there are different descriptions of the terminology in reference. However, [36] have managed to obtain three common characteristics: a) Adaptability is a characteristic of a substantial or community structure, b) The system can respond to changes, interruptions or risks using resistance, absorption or reworking or an arrangement of these and c) The structure can endure functioning at some near after the interruption: recurring to its unique formal or, possibly, to a modified and enhanced state. These descriptions align with the definition proposed by Cutter in one of his most cited articles in Scopus, which was introduced in the previous paragraphs [23], [37], [38].

Regarding the search for dimensions or areas of study, the Livelihood Security and Resilience Assessment (LiSeRA) agenda contains two main dimensions: livelihoods and adaptability. The latter integrates governance parameters, as defined by various legislation, guidelines, laws, and other relevant regulations. The livelihoods dimension includes five resources resulting from the hypothetical values of environmental maintenance resources: Human, Physical, Natural, Commercial, and Communal. These capitals largely coincide with the dimensions identified in the articles proposed by the bibliometrics. However, this grouping is initially within the livelihood dimension. The social capital dimension remains pending, as discussed in the results.

Specifically, some authors recognise this dimension as the serious part of communal investment and systems in catastrophe endurance and retrieval, particularly in the face of increasing losses of anthropological life and economic charges, whereas much investigation and strategy focus on objective structure for natural disaster adaptability. Regarding the environmental component, it is estimated that this would be the primary area to measure community adaptability; however, there is no evidence to support this in the articles or case studies.

In general, there is no agreement on which characteristics or measurements are most significant in measuring them. However, a long list of variables that comprise each dimension was identified. It is evident that in the area of community capital, most of its attributes to be measured respond to a qualitative metric. Many of these variables are dichotomous, referring to the presence or absence of specific elements within the community, such as the presence or absence of religious networks or affiliations, civic organisations, volunteering, and access to healthcare, among others. Retirement, income inequality, and education were also important factors in some of the studies, which used variables such as retiree wealth, revenue balanced, and instructive accomplishment as precise variables. Extenuation, both in the procedure of strategies and explicit activities, was stated several times in the trainings, but the actions or activities for such mitigation were not specified.

Studies show that family ties and households are fundamental to community adaptability, as families often serve as the primary providers of food and social support. Catastrophe adaptability design must include nearby tailored appointments to guarantee greater accomplishment in attaining communal adaptability. The way communities can manage their capacity to recover effectively depends on the gradation to which various particular and communal attributes are extant in the people. For example, the effectiveness of initial recovery from a natural phenomenon, such as an earthquake, will be influenced by individuals' capacity for self-sufficiency and their immediate response to this challenge, which involves understanding seismic activity and family practices in disaster preparedness. Emerging recovery issues include the possibility of forming self-help collections with neighbours and others to address resident problems, such as debris removal and establishing community meeting spaces. Subsequently, the reestablishment of community groups or the formation of new ones, community leadership, the aptitude to interact with others in original conditions to address problems, and volunteer actions contribute to explaining the differences in community earthquake levels [39]. A common feature of community groups is that volunteers play key roles within them.

Finally, one of the contests in communal adaptability is understanding the vulnerability of countryside and metropolitan spaces, given the scarcity of studies on the subject. Considering the structure of residences is significant since the background and risk administration capacities differ significantly in each region. For example, some authors have originated that the redeployment of susceptible peoples afterward a catastrophe differs between metropolitan and countryside spaces. They initiate that, in metropolitan spaces, longstanding repossession often relocates susceptible citizens away from the region's most severely affected. In contrast, in rural areas, post-disaster recovery usually results in a concentration of socially vulnerable peoples.

5. Conclusion

In recent decades, much research has emerged to understand adaptability, especially community adaptability. Documentary research has defined it as the ability to anticipate, formulate, and strategy to recuperate and adjust to disasters arising from opposing proceedings and their impacts.

Adaptability measurement presents dimensions that most authors agree on, consisting of six: Environmental, Social, Institutional, Infrastructure, Economic, and Social Capital, each with some variables defined by some authors from one perspective and others from another or complementary perspective. Therefore, an average of 30 variables has been identified for each dimension; however, the studies reviewed do not assign a level of importance or weight to the dimension or variable in each area of study.

There is an absence of realistic investigation on communal-level indicators of adaptability to natural hazards. The results of this research will enable an examination or comparison between locations in terms of their current levels of adaptability. This would provide supervision on structural, financial, or community aspects that could reduce the effects of catastrophes and hasten recuperation and/or capacity building for the people in the area. Measuring community adaptability in the future will require new, interdisciplinary, structures-constructed styles that rely on multiple disciplines, containing concocting, social sciences, economics, and knowledge technology, among others. These approaches will be segmented at both the urban and rural levels, providing authorities with tools that enable them to make informed decisions on how to manage and mitigate risks from natural disasters.

References:

[1]. Bitrán, D. (1995). *Impacto económico de los desastres naturales en la infraestructura de salud: Rentabilidad de las medidas de mitigación (Versión revisada)* (LC/MEX/R.543). Comisión Económica para América Latina y el Caribe (CEPAL).

[2]. Guerrero Compeán, R., & Lacambra Ayuso, S. (2020). *Disasters and loss of life: New evidence on the effect of disaster risk management governance in Latin America and the Caribbean*. IDB Working Paper Series. Doi: 10.18235/0002781

[3]. Gall, M., et al. (2011). The unsustainable trend of natural hazard losses in the United States. *Sustainability*, *3*(11), 2157-2181. Doi: 10.3390/su3112157

[4]. Pyda, J., et al. (2019). Towards resilient health systems: opportunities to align surgical and disaster planning. *BMJ global health*, *4*(3). Doi: 10.1136/bmjgh-2019-001493

[5]. Phibbs, S., et al. (2016). Synergising public health concepts with the Sendai framework for disaster risk reduction: A conceptual glossary. *International journal of environmental research and public health*, *13*(12), 1241. Doi: 10.3390/ijerph13121241

[6]. Wisner, B., Gaillard, J. C., & Kelman, I. (2012). *Handbook of hazards and disaster risk reduction*. Routledge.

[7]. Terreros, J. A. P. (2024). La gestión de la reducción del riesgo de desastres como estrategia de planificación e integración en el Perú. *Earth Institute Journal*, (1), 31-42. Doi: 10.71018/eij.2024.05

[8]. Etinay, N., Egbu, C., & Murray, V. (2018). Building urban resilience for disaster risk management and disaster risk reduction. *Procedia engineering*, *212*, 575-582. Doi: 10.1016/j.proeng.2018.01.074

[9]. Cui, K., Han, Z., & Wang, D. (2018). Resilience of an earthquake-stricken rural community in southwest China: Correlation with disaster risk reduction efforts. *International journal of environmental research and public health*, *15*(3), 407. Doi: 10.3390/ijerph15030407

[10]. Lucatello, S., & Alcántara-Ayala, I. (2023). Addressing the interplay of the Sendai Framework with sustainable development goals in Latin America and the Caribbean: moving forward or going backwards?. *Disaster Prevention and Management: An International Journal*, *32*(1), 206-233. Doi: 10.1108/DPM-07-2022-0152

[11]. Joerin, J., et al. (2012). Assessing community resilience to climate-related disasters in Chennai, India. *International Journal of Disaster Risk Reduction*, *1*, 44-54. Doi: 10.1016/j.ijdrr.2012.05.006

[12]. Walters, P. (2015). The problem of community resilience in two flooded cities: Dhaka 1998 and Brisbane 2011. *Habitat International*, *50*, 51-56. Doi: 10.1016/j.habitatint.2015.08.004

[13]. Ntontis, E., et al. (2020). Endurance or decline of emergent groups following a flood disaster: Implications for community resilience. *International Journal of Disaster Risk Reduction*, *45*, 101493. Doi: 10.1016/j.ijdrr.2020.101493

[14]. Chandra, A., et al. (2011). Building community resilience to disasters: A way forward to enhance national health security. *Rand health quarterly*, *1*(1), 6.

[15]. Andrew, M. (2018). Revisiting community-based disaster risk management. *Reducing disaster risks*, 42-52. Routledge.

[16]. Sandoval-Díaz, J., Muñoz, M. N., & Martínez, D. C. (2023). Revisión sistemática sobre la capacidad de adaptación y resiliencia comunitaria ante desastres socionaturales en América Latina y el Caribe. *Revista de Estudios Latinoamericanos sobre Reducción del Riesgo de Desastres REDER*, *7*(2), 187-203.

[17]. Maskrey, A., & Lavell, A. (2024). DRR pioneers interview with Andrew Maskrey and Allan Lavell. *Disaster Prevention and Management: An International Journal*, *33*(1), 45-60. Doi: 10.1108/DPM-10-2023-0256

[18]. Paton, D., & Buergelt, P. (2019). Risk, transformation and adaptation: Ideas for reframing approaches to disaster risk reduction. *International journal of environmental research and public health*, *16*(14), 2594. Doi: 10.3390/ijerph16142594

[19]. Codina, L. (2005). Scopus: el mayor navegador científico de la web. *El profesional de la información*, *14*(1), 44-49.

[20]. Cutter, S. L., et al. (2008). A place-based model for understanding community resilience to natural disasters. *Global environmental change*, *18*(4), 598-606. Doi: 10.1016/j.gloenvcha.2008.07.013

[21]. Cutter, S. L., Ash, K. D., & Emrich, C. T. (2014). The geographies of community disaster resilience. *Global environmental change*, *29*, 65-77. Doi: 10.1016/j.gloenvcha.2014.08.005

[22]. Sherrieb, K., Norris, F. H., & Galea, S. (2010). Measuring capacities for community resilience. *Social indicators research*, *99*(2), 227-247. Doi: 10.1007/s11205-010-9576-9

[23]. Cutter, S. L. (2016). The landscape of disaster resilience indicators in the USA. *Natural hazards*, *80*(2), 741-758. Doi: 10.1007/s11069-015-1993-2

[24]. Lew, A. A. (2014). Scale, change and resilience in community tourism planning. *Tourism Geographies*, *16*(1), 14-22. Doi: 10.1080/14616688.2013.864325

[25]. Burton, C. G. (2015). A validation of metrics for community resilience to natural hazards and disasters using the recovery from Hurricane Katrina as a case study. *Annals of the Association of American Geographers*, *105*(1), 67-86. Doi: 10.1080/00045608.2014.960039

[26]. Ellingwood, B. R., et al. (2016). The Centerville virtual community: A fully integrated decision model of interacting physical and social infrastructure systems. *Sustainable and Resilient Infrastructure*, *1*(3-4), 95-107. Doi: 10.1080/23789689.2016.1255000

[27]. Yoon, D. K., Kang, J. E., & Brody, S. D. (2016). A measurement of community disaster resilience in Korea. *Journal of environmental Planning and Management*, *59*(3), 436-460. Doi: 10.1080/09640568.2015.1016142

[28]. Cohen, O., et al. (2013). The conjoint community resiliency assessment measure as a baseline for profiling and predicting community resilience for emergencies. *Technological Forecasting and Social Change*, *80*(9), 1732-1741. Doi: 10.1016/j.techfore.2012.12.009

[29]. N. Lam, N. S., et al. (2016). Measuring community resilience to coastal hazards along the Northern Gulf of Mexico. *Natural hazards review*, *17*(1), 04015013. Doi: 10.1061/(ASCE)NH.1527-6996.0000193

[30]. Norris, F. H., et al. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American journal of community psychology*, *41*(1), 127-150. Doi: 10.1007/s10464-007-9156-6

[31]. He, X., & Cha, E. J. (2022). State of the research on disaster risk management of interdependent infrastructure systems for community resilience planning. *Sustainable and Resilient Infrastructure*, *7*(5), 391-420. Doi: 10.1080/23789689.2020.1871541

[32]. Walker, B., et al. (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecology and society*, *9*(2)

[33]. Perrings, C., & Walker, B. (1997). Biodiversity, resilience and the control of ecological-economic systems: the case of fire-driven rangelands. *Ecological Economics*, *22*(1), 73-83. Doi: 10.1016/S0921-8009(97)00565-X

[34]. Rose, A. (2004). Defining and measuring economic resilience to disasters. *Disaster Prevention and Management: An International Journal*, *13*(4), 307-314. Doi: 10.1108/09653560410556528

[35]. Volckens, J., et al. (2023). Health research in the wake of disasters: challenges and opportunities for sensor science. *Environmental health perspectives*, *131*(6), 065002. Doi: 10.1289/EHP12270

[36]. Rehak, D. (2020). Assessing and strengthening organisational resilience in a critical infrastructure system: Case study of the Slovak Republic. *Safety Science*, *123*, 104573. Doi: 10.1016/j.ssci.2019.104573

[37]. Cutter, S. L., et al. (2013). Disaster resilience: A national imperative. *Environment: Science and Policy for Sustainable Development*, *55*(2), 25-29. Doi: 10.1080/00139157.2013.768076

[38]. Cutter, S. L., Ash, K. D., & Emrich, C. T. (2016). Urban–rural differences in disaster resilience. *Annals of the American Association of Geographers*, *106*(6), 1236-1252. Doi: 10.1080/24694452.2016.1194740

[39]. Cook, D. T., et al. (2022). A framework for operationalizing the assessment of post-earthquake functional recovery of buildings. *Earthquake Spectra*, *38*(3), 1972-2007. Doi: 10.1177/87552930221081538