Research paper

The Sustainability of Livelihoods during Crisis - Mapping Evidence, Gaps, and Future Directions

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Abstract

Human society is staring at an unprecedented convergence of cascading crises that threaten the sustainability of livelihoods worldwide. Despite the critical importance of understanding how such crises impact the ability of individuals and communities to sustain their livelihoods, research in this area remains fragmented and limited, especially within the sustainability domain. This gap is addressed by conducting a comprehensive meta-synthesis of 102 peer-reviewed journal articles (shortlisted via manual review of 862 articles) guided by the variables provided by the Sustainable Livelihood Approach (SLA). Building on theoretical literature on SLA, this article conceptualises crisis as a contextual variable affecting the relationship between livelihood resources, livelihood strategies, and sustainable livelihood outcomes. Through scientometric and content analysis, the article clarifies the complex interconnections between crises and sustainable livelihoods. By identifying longitudinal research trends and synthesising key findings on the sustainability of livelihoods during crises, it enables a deeper understanding of livelihood sustainability in an increasingly crisis-ridden world. Co-authorship analysis reveals limited collaboration: 217 researchers from 148 organisations produced these studies, but there are only two large research clusters. Content analysis reveals the following key insights: a) existing studies on the sustainability of livelihoods during crises need to characterise the various dimensions of crises in greater detail; b) when characterising sustainability-oriented livelihood outcomes during crises, there is minimal evidence of sustainability-related trade-offs or synergies amongst outcomes (3 studies: 3.3%); c) minimal evidence is available on the feedback effects of such outcomes; and, d) more research must be conducted on how power and conflict affect the association between sustainability of livelihoods and crises (12 studies,13.2%, examined conflict causes). This article is a valuable tool for scholars, practitioners, and policymakers, as it: a) identifies gaps for further research; b) provides a structured framework for analysing how different types and dimensions of crises affect livelihood resources, strategies, and outcomes; and c) offers actionable insights for designing sustainable livelihood interventions in the face of future crises.

Keywords: Sustainable Livelihoods · Crises · Sustainable Livelihood Approach · Scientometric Analysis · Content Analysis

1. INTRODUCTION

Humanity is hurtling towards disaster. Our society is unprepared to tackle the confluence of several cascading crises that lie ahead (Robinson et al., 2021). For instance, consider the effects of the Covid-19 pandemic: it has severely affected the attainment of sustainable development goals (health crisis), the Russo-Ukrainian war has led to global food shortages, energy scarcity, and large-scale migration (humanitarian crisis), the economies of several nation-states (such as Sri Lanka) have collapsed (economic crisis) – all against the backdrop of a declining planetary life-support system (UN, 2022). As crises become increasingly frequent and interconnected, their occurrence is often characterised by uncertainty (Makridakis & Taleb, 2009; Pot et al., 2022) or multiplier effects that amplify their impact on associated systems (Huang et al., 2020).

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Sustainability and crises are intrinsically linked. One critical area within this context is livelihoods. Livelihoods provide people with the means to secure necessities for survival (Chambers, 1995). Livelihood analysis involves examining the activities, assets, and capabilities individuals use to make a living (Scoones, 1998; Scoones, 2015). Human society is characterised by an "infinite" variety of livelihood practices—from traditional subsistence activities like foraging in remote forests (Undurraga et al., 2014) to complex industrial and urban livelihoods at technological frontiers (Laschefski, 2019).

Crises profoundly affect livelihoods. For example, during the COVID-19 pandemic in India, a survey revealed that over two-thirds of respondents experienced heightened livelihood insecurity within months of the virus's detection (Kesar et al., 2021). Similar trends have been observed globally (Workie et al., 2020). However, the impact of crises on livelihoods is not confined to health emergencies; humanitarian crises (Kolade et al., 2022) and ecological disasters (Sodhi et al., 2006) also disrupt livelihoods. Despite these observations, there is limited research on how livelihood effects vary across different types of crises, such as health, humanitarian, ecological, or economic, and their multi-dimensional characteristics.

Crises can be analysed from nuanced perspectives: origin (internal/external), scale (local/multi-level), nature (fast-burning/slow-burning), predictability (conventional/unexpected), phases (early/recovery/long-term), effects on stakeholders, manageability, and more (Pearson & Mitroff, 1993a; Christensen & Kohls, 2003; Gundel, 2005; Kuipers & Welsh, 2017; Boin et al., 2020). However, there is limited clarity on how variations in these dimensions influence livelihood outcomes. This gap becomes even more pronounced in sustainability research—a multi-dimensional field that examines trade-offs among social, economic, and ecological goals (Virtanen et al., 2020). For instance, are sustainability concerns sacrificed for immediate survival needs during crises? Or do crises enable synergies across livelihood outcomes? What drives these trade-offs or synergies? Are such effects transient or long-lasting? While some research suggests ecological impacts may be temporary, such as reduced CO2 emissions during pandemic lockdowns, economic and social effects often persist longer in sectors like tourism or hospitality (Le Quéré et al., 2021; Romagosa, 2020; Jones & Comfort, 2020).

Given these gaps in understanding sustainable livelihoods during crises, this study addresses the research question: What does extant literature reveal about the sustainability of livelihoods during crises? The study employs an innovative theoretical framework based on the Sustainable Livelihood Approach (SLA), enriched with a nuanced characterisation of crises to structure its analysis. Using quantitative scientometric analysis and content analysis, this study makes two key contributions: a) it identifies intellectual structures and patterns within existing research using co-authorship analysis, citation analysis, bibliographic coupling analysis, and thematic pattern recognition; and b) it outlines an agenda for future studies by highlighting critical gaps and questions using quantitative content analysis and meta-synthesis.

2. THEORETICAL FRAMEWORK FOR STRUCTURING ANALYSIS

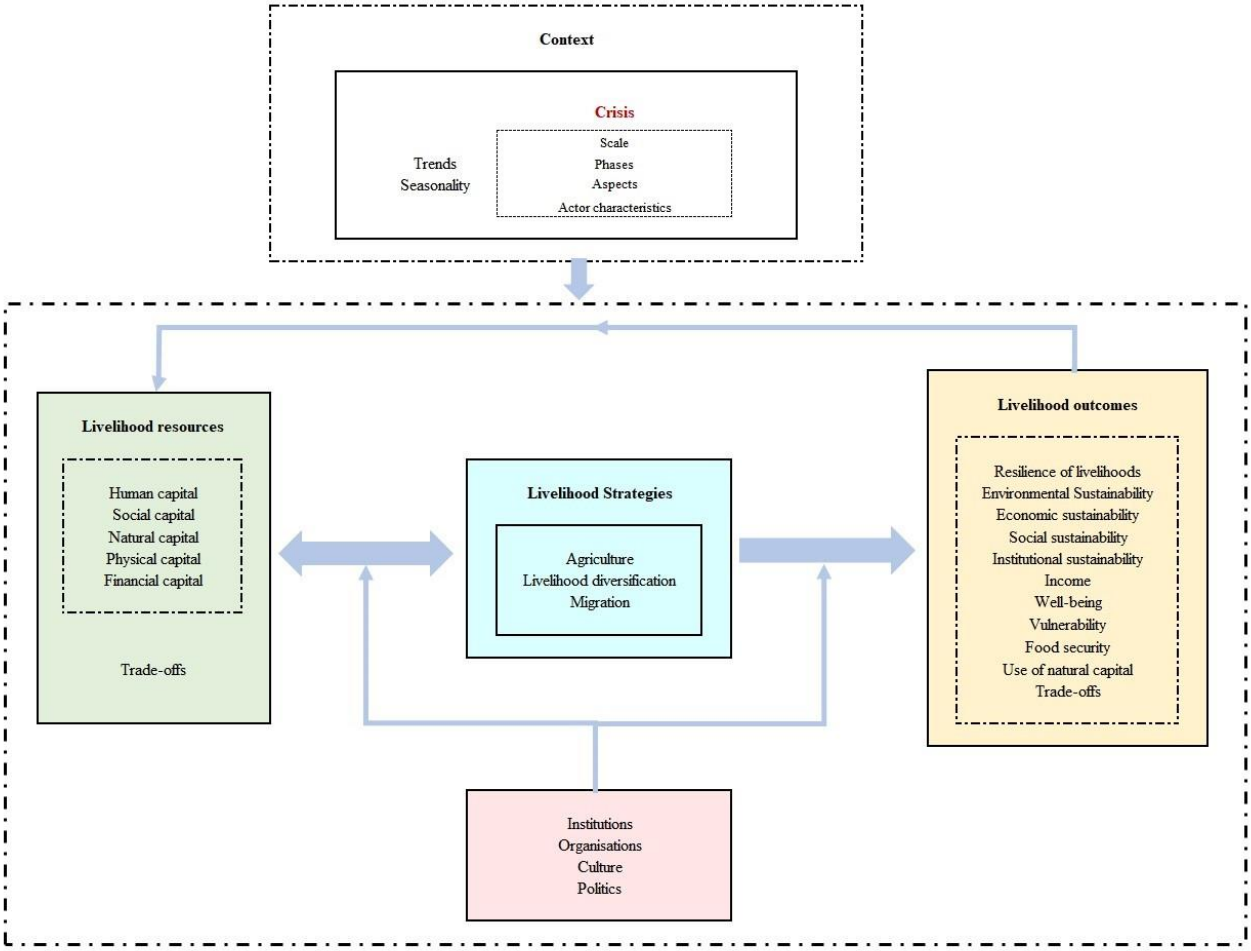

Figure 1. Theoretical Approach. Adapted from Scoones (1998; 2015)

A variety of approaches for analysing sustainable livelihoods characterise scholarly literature: sustainable livelihood approach (SLA), household economics, village studies, farming systems research, participatory appraisal, cultural ecology, agroecosystem analysis, political ecology, socio-environmental change, resilience et al. (Scoones, 2015).

Amongst these approaches, this research draws on the SLA proposed by Scoones (1998; 2015) to answer this article's research question because SLA provides a detailed framework of variables for characterising the sustainability of livelihoods, livelihood outcomes, and trade-offs or synergies amongst such outcomes. In addition, the SLA has been one of the most widely used approaches for livelihood analysis since it was first proposed in the 90s and continues to be widely used (Scoones, 2015; Nath et al., 2020; Nath et al., 2021). It can be applied across various scales, ranging from the actor level to higher levels of sub-national, national, or regional aggregation. The SLA is widely used because it can be used as a "diagrammatic checklist" of variables for analysing the sustainability of livelihoods (Scoones, 2015).

According to the SLA, a livelihood can be considered sustainable if it can adapt to crisis without compromising the ability of associated assets, capabilities, and resources to continue supporting the livelihood into the future (Scoones, 1998). Five groups of variables characterise this approach: a) livelihood outcomes, b) livelihood strategies, c) livelihood resources, d) culture, organisations, institutions, & moderating political variables that affect livelihoods, and e) context (see Figure 1). Using these variables, the guiding principle underlying the SLA can be stated as follows: depending on the context, different combinations of resources can lead to different livelihood strategies. These livelihood strategies can lead to different livelihood outcomes after being moderated or mediated by varied institutional, cultural, organisational, and political variables (Nath et al., 2020). Analysis of livelihoods using SLA begins by analysing the resources that can be used to pursue various

livelihood strategies. SLA uses the language of capitals to analyse varied livelihood resources: natural, physical, financial, social, and human capital. Varied combinations of these resources can be used to pursue varied livelihood strategies: agriculture, diversification, or migration. Varied institutional variables (policies, legislation, formal rules, informal norms), culture, organisations (public sector, private commercial, civil society), and political variables (power, conflict) can influence the relationship between livelihood strategies and livelihood outcomes (resilience of livelihoods, environmental sustainability, economic sustainability, social sustainability, institutional sustainability, income, well-being, vulnerability, food security, use of natural capital) depending on the context (trends such as changes in population, seasonality and crisis). See Appendix 1 in the Supplementary file for detailed definitions of these variables.

The SLA links sustainable livelihoods indirectly to crisis. It argues that livelihoods are affected by contextual variables such as stresses and shocks. Stresses are steady disturbances with minor and predictable effects in the short term but more significant, cumulative effects in the long term. In contrast, shocks are unpredictable disturbances with immediate, severe impacts (Scoones, 1998). Concepts such as shocks and stresses are commonly used in the disaster management literature to analyse the effects of hazards or disturbances (cyclones, floods, etc.) on livelihoods (Wolbers et al., 2021). These concepts are also widely used in other disciplines, such as finance, where shocks and stresses are sometimes conceptualised as a continuum of crisis (Illing & Liu, 2006). Such characterisation of shock, stress, and crisis on a continuum is also seen in psychology (Holahan & Moos, 1990). Shocks and stresses are also conceptualised as types of crisis in the policy sciences (van Hooren et al., 2014) and economics (Schildberg-Hörisch, 2018).

Therefore, with an eye on generalisation, this article conceptualises shocks and stresses as types of crises (see Figure 1). A crisis occurs when a community (group of close-knit actors, organisations, towns, or nation-states) perceives a threat (to their way of life), resulting in instability, which requires immediate or sustained decision-making (crisis management) in the face of uncertainty and time-pressure (Wolbers et al., 2021). Such perceptions of threat can arise from shocks, stresses, perturbations, disasters, hazards, harm, or adversity and can have material, physical, or psychological impacts.

Crisis is a multi-dimensional variable: a) scale: a spatial or analytical dimension where a higher level refers to a more significant phenomenon (Gibson et al., 2000); b) phases: the stages (signal detection, preparation/ prevention/ mitigation, response: containment/ damage litigation, recovery, learning) through which all crises pass (Pearson & Mitroff, 1993b); c) aspects: characteristics of crises such as the magnitude of consequences, urgency, uncertainty, ambiguity, and complexity (Christensen & Kohls, 2003); and d) actor characteristics: characteristics such as slack resources, the strength of social relationships, coping strategies and crisis preparation of actors (affected by crises), which influence the capacity to tackle crises (Christensen & Kohls, 2003).

Therefore, this article conceptualises crisis as a contextual variable affecting the relationship between livelihood resources, livelihood strategies, and livelihood outcomes. Other critical contextual variables include trends (population changes) and seasonality (Scoones, 1998; Scoones, 2015). See Appendix 1 in the Supplementary file for detailed definitions of these variables.

These variables are then used to structure quantitative scientometric analysis, quantitative content analysis, and meta-synthesis of the state-of-the-art literature on sustainable livelihoods during crises, as detailed in the next section (Figure 2).

3. METHODOLOGY

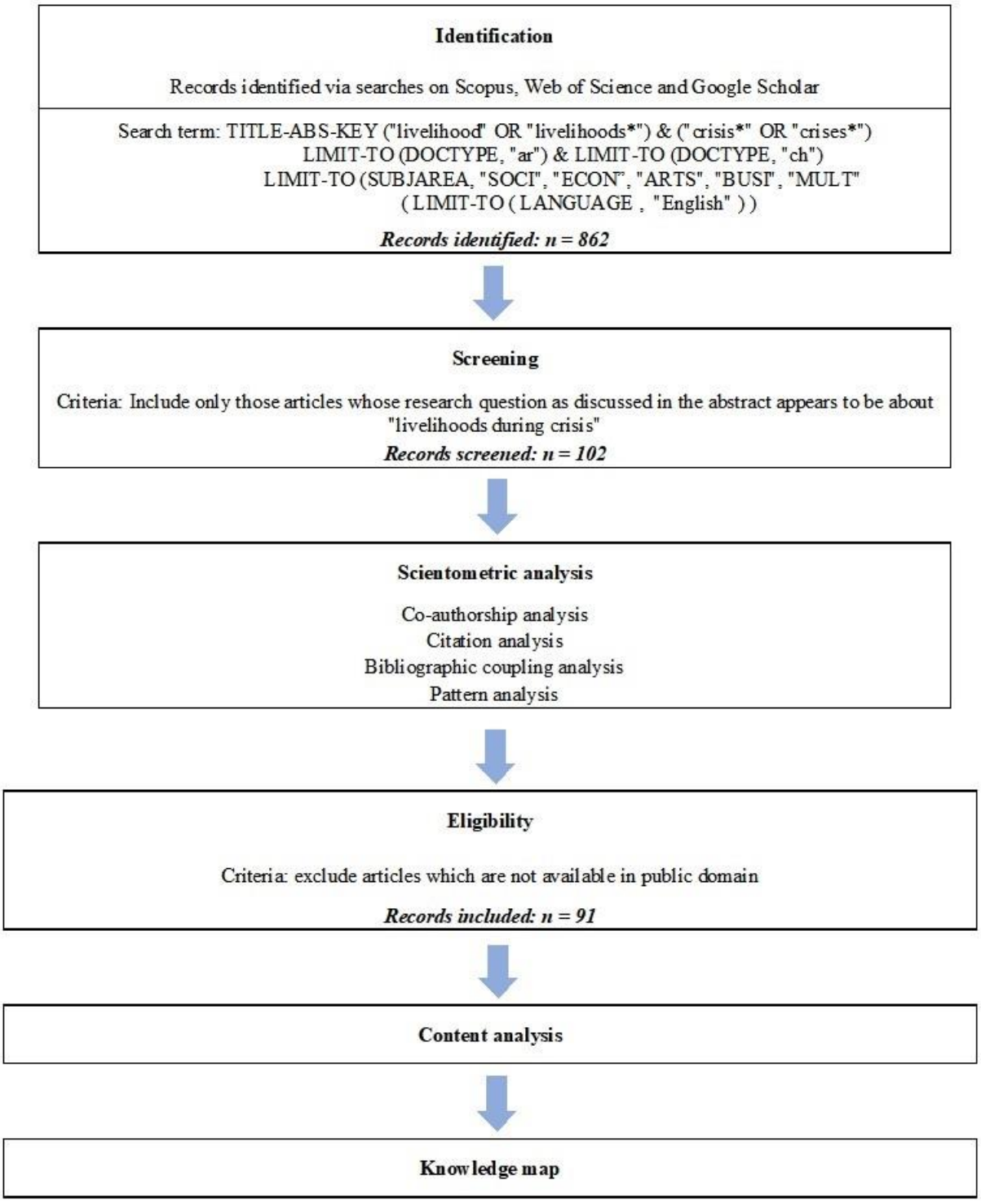

Figure 2. Methodology

This article's *research question* is: What does extant literature tell us about the sustainability of livelihoods during crises? This question has been answered via meta-synthesis (Cooper et al., 2009) of empirical research

published in peer-reviewed articles. PRISMA[4] guidelines proposed by Moher et al. (2009) were used to structure this part of the research. See Figure 2.

3.1 Data Extraction

Data for this research were extracted from Scopus, Web of Science, and Google Scholar using the search terms: ("livelihood" OR "livelihoods*") & ("crisis*" OR "crises*"). All articles published till and including 2021 were included in the search. This search was conducted towards the end of December 2021. Document language was limited to English. Search disciplines were limited to the social sciences, economics, business, arts & humanities, and multi-disciplinary areas. The three datasets were then merged using Microsoft Excel. Duplicates were removed.

3.2 First Round of Analysis

This resulted in 862 documents, which were then narrowed down to 102 via manual review using the following criteria: Include those articles whose research question, as discussed in the abstract, appears to be about "livelihoods during crisis". Based on this criterion, screened documents were classified into three categories: a) Yes, b) Maybe, and c) No. Two reviewers re-reviewed all documents clubbed into the 'Yes' and 'Maybe' categories. Disagreement between reviewers was resolved via verbal discussion. These discussions centred around understanding whether livelihoods and crises were central to the document under consideration. Scientometric analysis (Co-authorship analysis, Citation analysis, Bibliographic coupling analysis, and Pattern analysis) was then conducted on 102 documents using Vosviewer. This tool uses advanced network analysis techniques, layout & clustering techniques, and natural language processing techniques for scientometric analysis and data visualisation (van Eck & Waltman, 2010). Out of the 102 documents on which scientometric analysis was conducted, 11 are not available in the public domain.

3.3 Content Analysis

Therefore, content analysis (Neuendorf et al., 2017) was performed on the remaining 91 documents by developing a coding framework using the theoretical approach discussed in the previous section. See Figure 1 and Appendix 1 in the Supplementary file. Coding was conducted in two stages: first, the documents were randomly allocated among two coders using the RAND function in Microsoft Excel. Each coder then analysed their assigned set of documents separately; next, all documents were recoded using Atlas.Ti. Any disagreement with the codes was resolved via verbal discussion. This ensured inter-coder reliability since for a population of 100, recoding 36 articles is enough for 95% agreement (see Lacy & Riffe, 1996). Maps were produced using www.mapchart.com and licensed under a Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0).

4. FINDINGS

4.1 Scientometric Analysis

Out of the 102 articles that constitute the dataset, 92 are empirical, and 10 are theoretical. The first article on livelihoods during crises was published in the period 1991 to 1995 (Figure 3a). This article focuses on economic crises and discusses how the globalisation-driven expansion of shrimp mariculture threatens rural livelihoods, undermines sustainability, and exacerbates economic crises by intensifying social conflict, marginalising the rural poor, and damaging Central America's environment. Nonetheless, the number of articles published between 1991 and 2000 is relatively low. Interest picked up steam gradually after 2000 and peaked between 2011 and 2015. Gradually, livelihoods during other kinds of crises began to be studied: natural, food, health, and war. Some of this research has been conceptualised as a livelihood crisis, focusing on situations where livelihoods were threatened. Interest in health crises picked up only after 2010 and has attracted increased attention since then. Economic crises continue to attract the most attention. Livelihoods during wars have been relatively under-studied – possibly because of data collection issues during such crises. For instance, an article published during the period 2001 to 2005 discusses how landmine proliferation due to war devastates African livelihoods, thwarts sustainable development, and deepens crises by restricting resource access, overwhelming healthcare systems, and perpetuating environmental harm.

[4] Preferred Reporting Items for Systematic Reviews and Meta-Analyses

		Type of Crisis						
		Economic	Natural	Food	Livelihoods	Health	War	*Grand Total*
Year of Publication	1991-1995	1						1
	1996-2000	1	1					2
	2001-2005	6	2	1			1	10
	2006-2010	6	4	2	2			14
	2011-2015	14	8	13	7	2		44
	2016-2020	6	3	1	2	1		13
	2021	1	2			5		8
	Grand Total	35	20	17	11	8	1	92

Figure 3a: Year and sector-wise trends

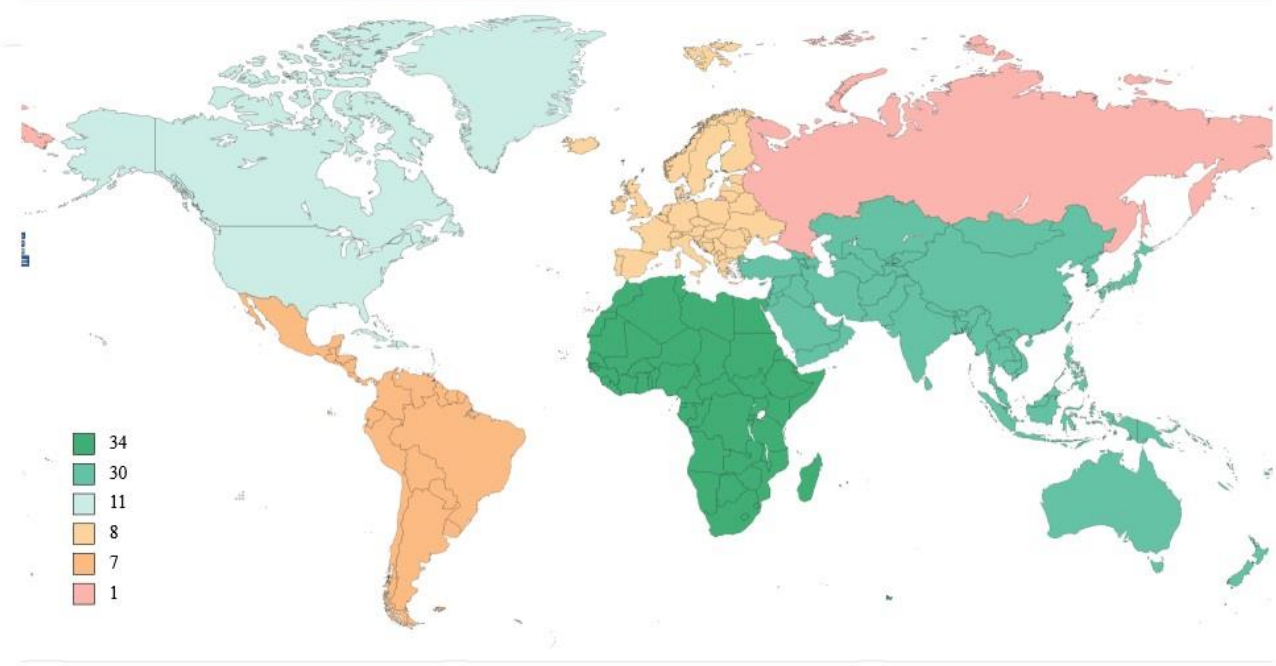

Figure 3b: Region-wise trends

Figure 3: Trends

Regarding regional trends, most of the research appears to be on crises in the Global South, with Africa (34 studies) leading the way. One notable exception to this rule is that livelihood issues during the Russian crisis (1 study) may be understudied. This study, published between 2006 and 2010, discusses how the prolonged Russian labour crisis between 1992 and 2007 pushed workers to prioritise survival over sustainability concerns or quality of life. The absence of research on Russian crises is significant because, geographically, Russia is vast, occupying approximately 10% of the total landmass of our planet (ALA, 2023). This region has been in constant turmoil, and additional research here may generate interesting insights on livelihoods in regions characterised by sustained crises. In addition, only one of the studies is transcontinental. This is another area for future research – more transcontinental research encompassing the Global North and Global South may answer why most of the recent research on livelihoods during crises is focused on the Global South. Nonetheless, most of the research in the Global South has been on crises in India (15 studies) and Zimbabwe (7 studies). Indian

and Zimbabwean studies are spread over time. There appears to be no year-wise clustering. While most Zimbabwean studies are on economic crises, Indian studies cover a more comprehensive range. These studies from Zimbabwe discuss how severe economic crises have eroded various forms of capital. The emergence of innovative, often informal, livelihood strategies—such as artisanal mining—has enabled households to sustain themselves despite the collapse of formal sectors and ongoing environmental, health, and political challenges. In contrast, research on India analyses the interconnections between various types of crises—economic, environmental, and health—and the resilience or vulnerability of sustainable livelihoods, highlighting the ways communities adapt through diversified agriculture, skill training, social innovation, and grassroots entrepreneurship to mitigate shocks and maintain livelihood security in the face of ongoing challenges.

Co-authorship analysis (Figure 4) reveals that 217 researchers have collaborated to produce 102 articles on livelihoods during crisis - on average, more than 2 authors have worked together to create each article. This statistic appears to suggest that research on livelihoods during crisis may be highly collaborative. However, Figure 4a demonstrates that most authors seem to be working independently: out of 101 nodes, only 6 nodes are highly networked– the number of items in such clustered nodes varies from 21 to 5.

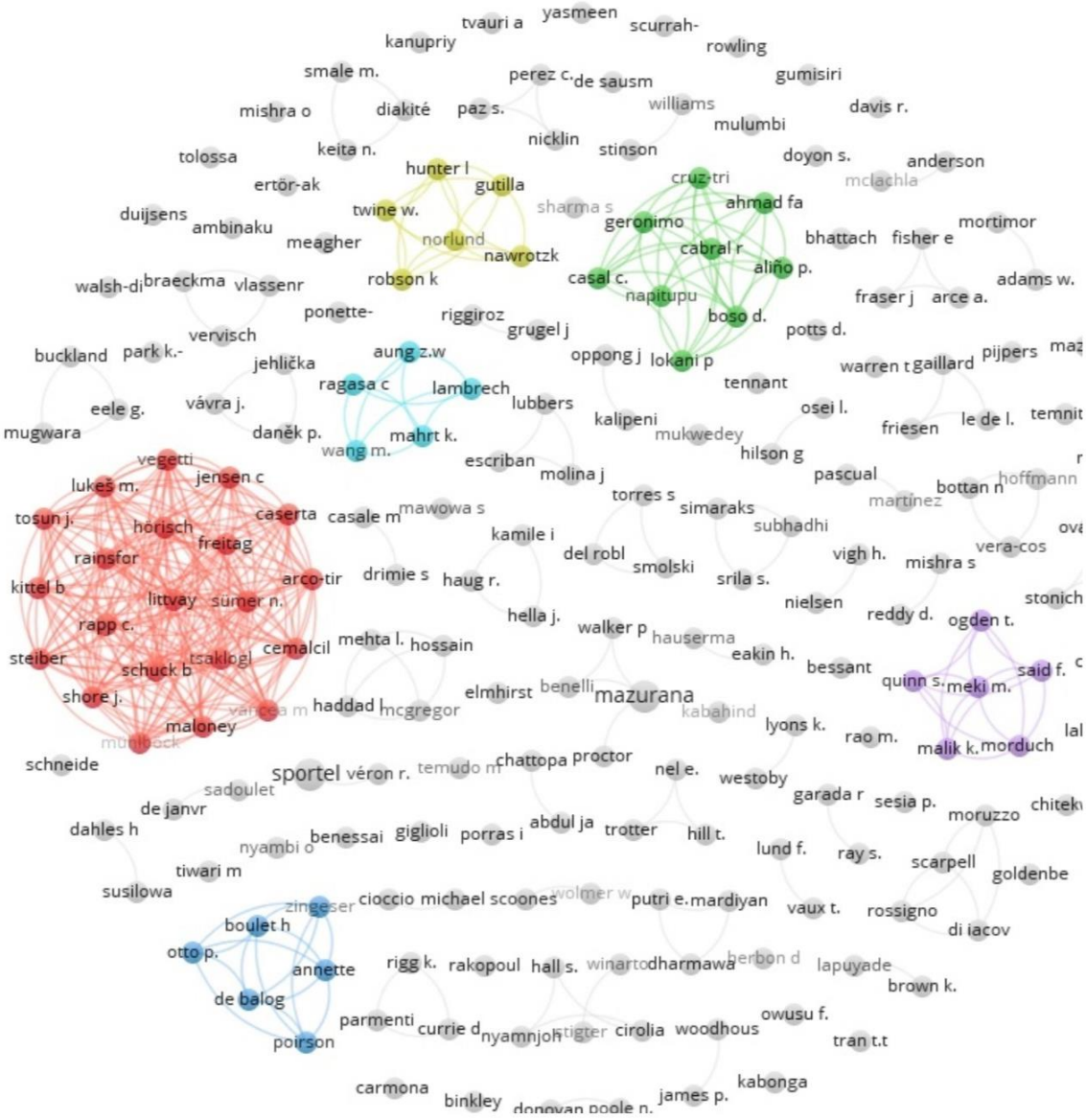

Figure 4a: Co-authorship analysis of authors

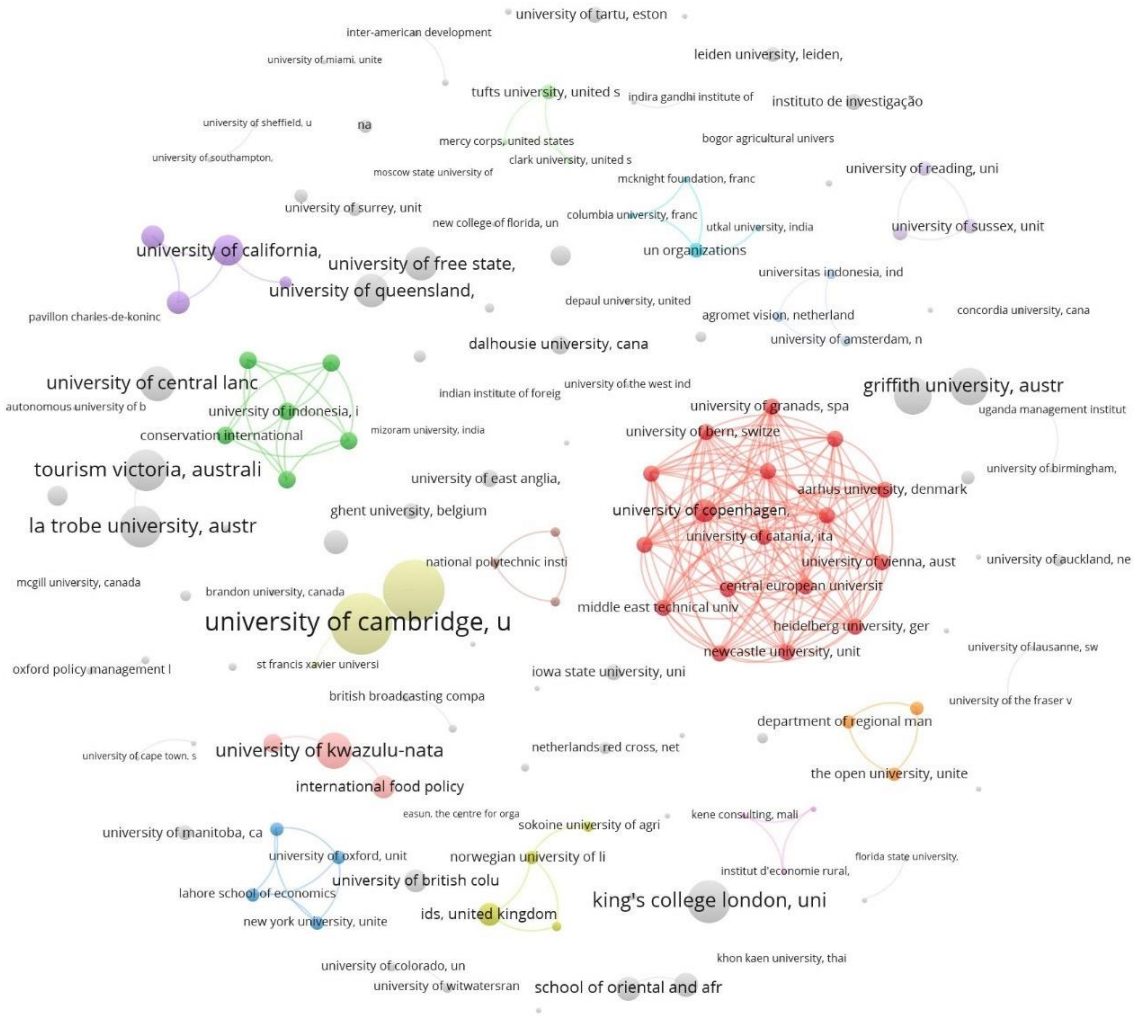

Figure 4b: Co-authorship analysis of organisations

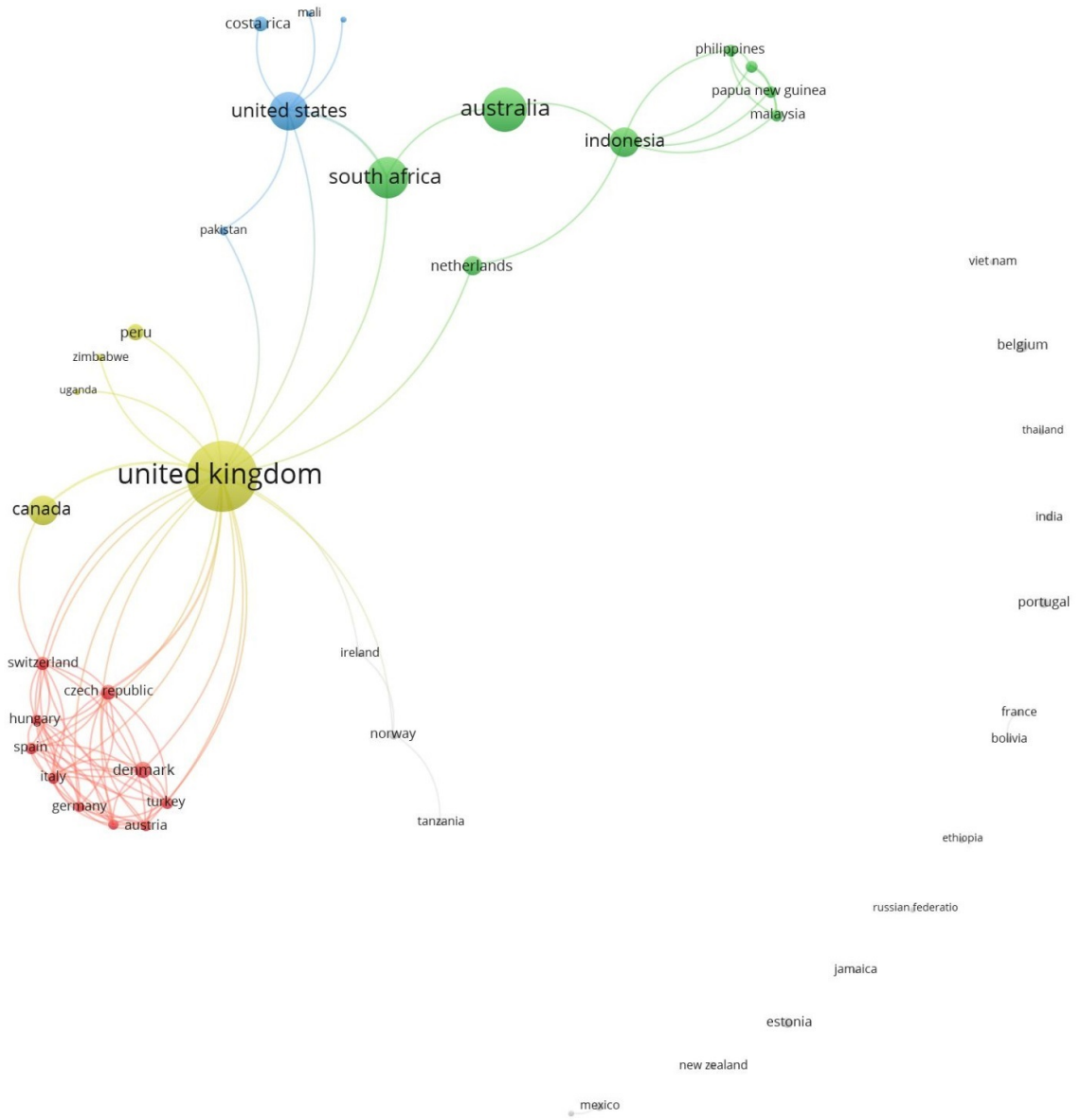

Figure 4c: Co-authorship analysis of countries

Figure 4: Co-authorship analysis

Figure 4b analyses co-authorship amongst organisations. It presents a similar story as Figure 4a – 217 researchers from 148 organisations have collaborated to produce 102 articles, but there are only two large clusters– the first consists of 17 items and the second consists of 6 items. Two conclusions can be drawn: a) most of the research in this area appears to be taking place in small independent hubs, and there is very little large-scale, collaborative research; b) even within organisations, most of the authors appear to be working independently.

Nonetheless, some of the larger networks are characterised by multi-sectoral attempts at collaboration, consisting of links amongst universities, research organisations (IFPRI[5], World Fish), multilateral organisations (UN), non-profit organisations, foundations, and consulting firms; however, such efforts are limited. Some of these networks are spread across continents. This is interesting because while research networks are transcontinental, most research sites are from the Global South. Research organisations, irrespective of whether they are in the North or the South, are primarily interested in crises occurring in the Global South. In Figure 4b, the size of each node is proportional to the number of citations garnered by articles produced by the organisation.

[5] The International Food Policy Research Institute

University of Cambridge, UK[6], and African Drylands Research, UK, are the highest-ranked organisations in terms of citations. However, organisations with higher citations are not part of the larger networks – these organisations appear to be working independently or as part of smaller research hubs.

Figure 4c analyses co-authorship across countries. The 148 organisations discussed above are from 45 countries: there are 4 large research networks (with cluster size greater than or equal to 5). These 4 large clusters are linked to each other. This contrasts with the large number of independent nodes characterising co-authorship among researchers (Figure 4a) and those amongst organisations (Figure 4b). The largest research network appears to be Euro-centric; the next one appears to be centred around the UK, the third one around the US[7], and the fourth one around Indonesia. This research network is primarily amongst Asian countries located around Indonesia. However, there appear to be strong North-South linkages in the networks centred around the UK and the US. The research network centred around the UK is also closely connected to the other large research networks. This probably explains why the UK produces the largest number of articles among all countries; the articles produced by it are highly cited, and it is one of the more central nodes in Figure 4c.

In general, research on livelihoods during crises has been published across a wide variety of peer-reviewed journals, including Global Environmental Change, Tourism Management, Annals of Tourism Research, Journal of Sustainable Tourism, Journal of Rural Studies, Geoforum, Food Policy, Disasters, IDS Bulletin, Development in Practice, etc.

Therefore, the co-authorship analysis of research on livelihoods during crisis indicates the absence of a global research program in this area: most authors appear to be working independently (also see Figure 5), publishing in a wide variety of journals, but very few seem to be conducting sustained, focused research in this area.

[6] United Kingdom

[7] United States of America

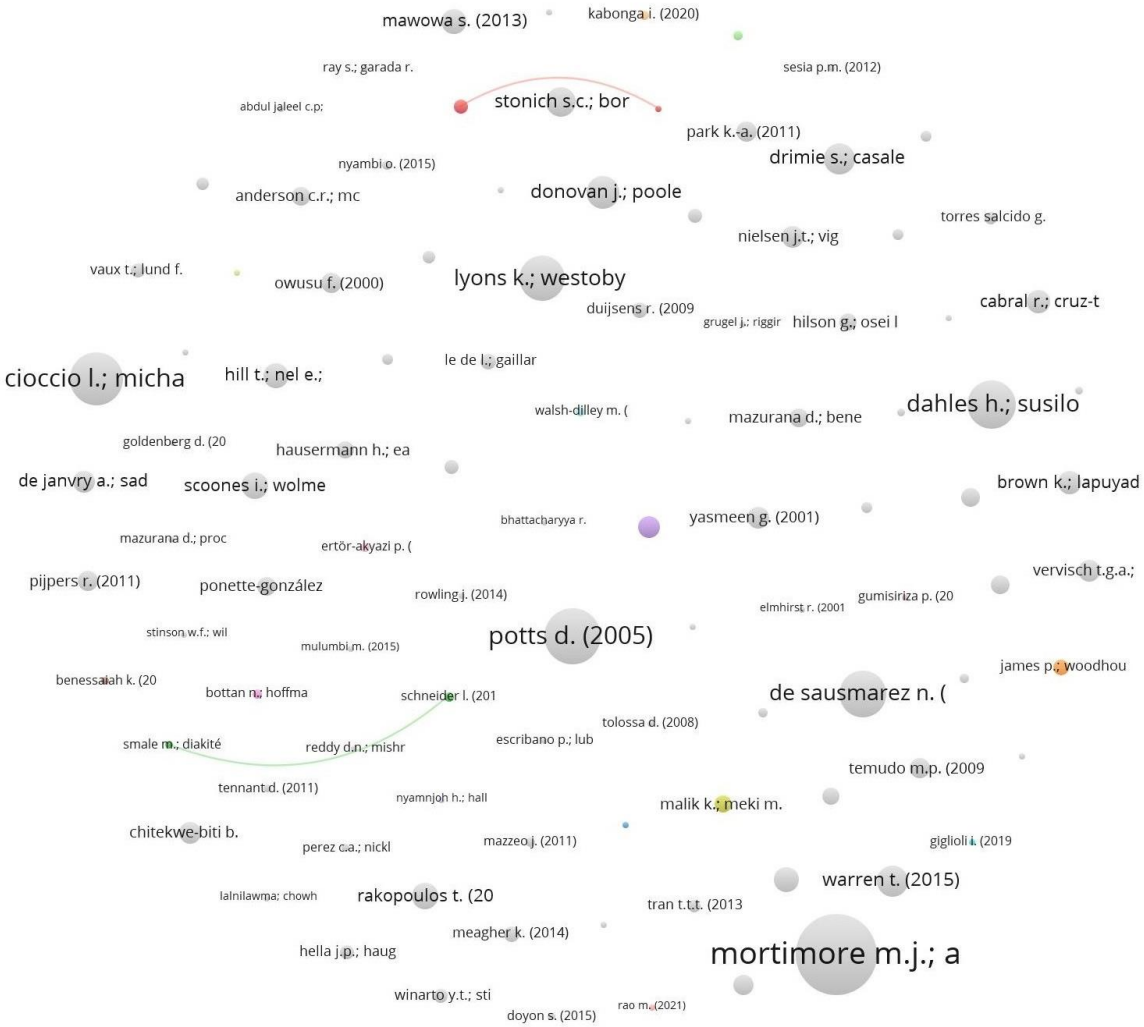

Figure 5a: Citation analysis

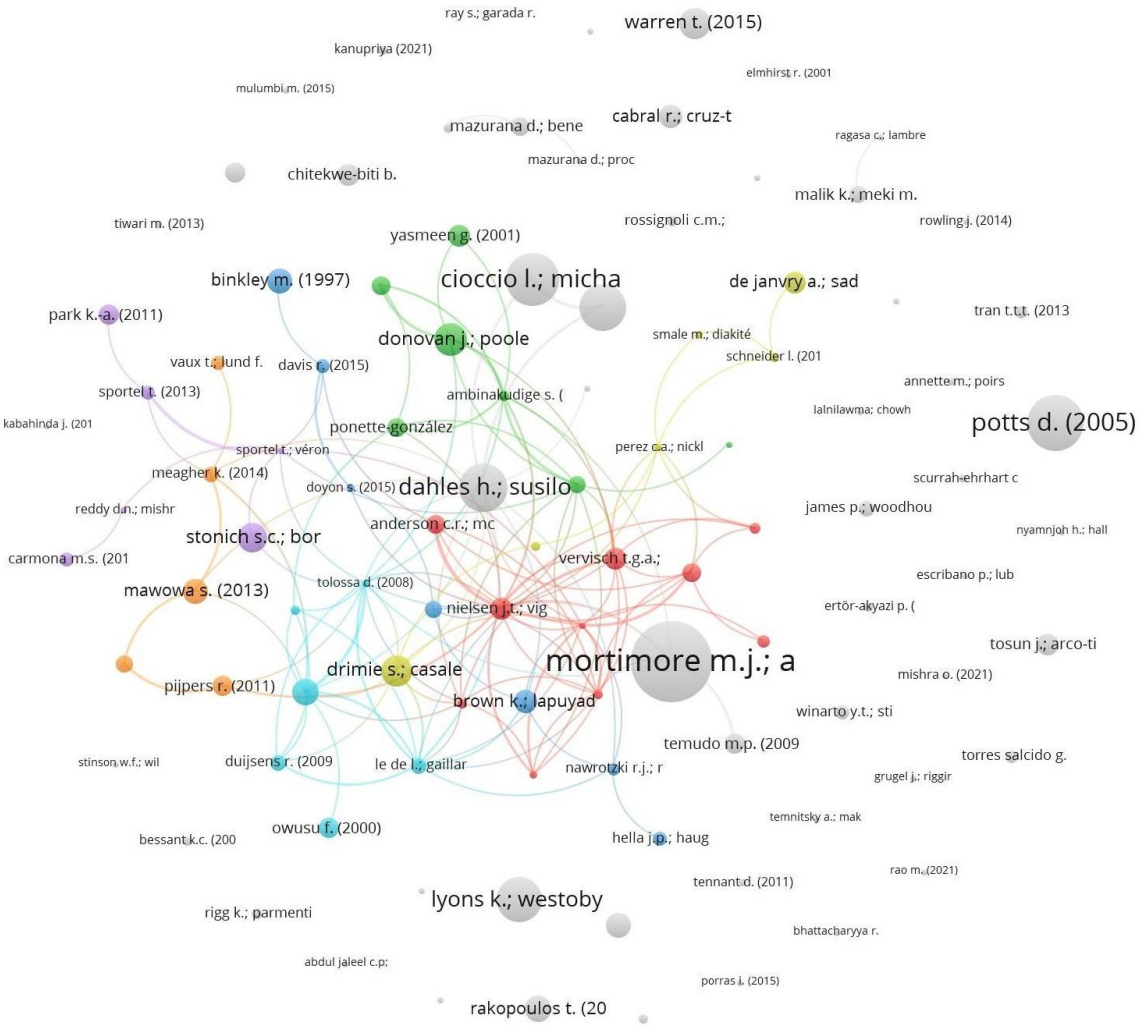

Figure 5c: Bibliographic coupling analysis

Figure 5: Analysis of Citations

Analysis of citations can be undertaken in two ways: a) analysis of citation links; and b) analysis of bibliographic coupling links. An undirected link between two articles where one article cites another is a citation link. On the other hand, a bibliographic coupling link is a link between two articles that cite the same article (van Eck & Waltman, 2010).

The larger the size of each node in Figure 5, the more heavily cited the article corresponding to that node. Figure 5a (analysis of citation links) is characterised by the absence of links amongst nodes, including amongst the larger nodes. The almost complete absence of links in Figure 5a indicates that articles on livelihoods during crisis are not citing each other. For instance, consider the top 3 articles with the largest number of citations: a) Mortimore and Adams (2001) published in Global Environmental Change; b) Dahles and Susilowati (2015) published in Annals of Tourism Research; c) Cioccio and Michael (2007) published in Tourism Management. There are no citation links among these articles, although all three articles discuss the diversification of livelihood strategies during crisis, and both Dahles and Susilowati (2015) & Cioccio and Michael (2007) have published their research in journals on tourism. This finding builds upon the conclusion drawn from the analysis of Figure 4 that there is no established global research program in this area. This is because. in a well-developed research program, such articles would have cited each other heavily, comparing and contrasting findings, leading to new research questions. Even though there are strong linkages among countries, most authors appear to be unaware of what others in the same country-network or organisational-network appear to be doing (Figure 4).

Bibliographic coupling analysis in Figure 5b reveals that its 101 nodes are characterised by 11 clusters with a count (linked items) greater than 2: the largest cluster consists of 10 items. The nodes in this cluster appear to be highly linked to each other. This implies that while sampled articles are not citing each other (Figure 5a), they seem to be citing similar articles that are not a part of our sample (Figure 5b) irrespective of the cluster to which they belong – for instance, they could be referring to the same theoretical literature on crisis or the same methodological articles or to the same "most-cited" articles in their respective disciplines. However, this behaviour is restricted to only a few sampled articles. Dahles and Susilowati (2015), discussed earlier, is one such article. Interestingly, two other articles with the highest number of citations, a) Mortimore and Adams (2001) & b) Cioccio and Michael (2007), do not fall within this category. There are 55 unlinked nodes (not part of any cluster greater than 2) in Figure 5b – these articles do not cite the same sources as the articles that are linked to each other. In addition, highly cited articles reference theoretical literature different from the less cited.

4.2 Content and Thematic Analysis

Out of the 102 documents on which scientometric analysis was conducted, 11 are not available in the public domain. Therefore, content analysis (Neuendorf et al., 2017) was performed on the remaining 91 documents.

Content analysis reveals that varied data collection (interviews, surveys, focus group discussions, workshops, ethnography, participatory, PRA[8], RRA[9], secondary), qualitative data analysis (case study, historical research, narratives analysis, content analysis, phenomenology, grounded theory) and quantitative data analysis techniques (descriptive statistics, cross-sectional regression analysis, Analysis of Variance (ANOVA), t-test, chi-square test, correlation, covariance, longitudinal regression analysis, factor analysis, cluster analysis, simulation) have been used analyse livelihoods during crisis (Figure 6). Primary data collection techniques are more popular than secondary techniques, with interviews being the most used. Qualitative data analysis techniques are more popular than quantitative data analysis techniques, although a significant chunk of articles analyse descriptive statistics. Use of regression techniques is limited, esp. longitudinal regression techniques. Simulations have been used sparsely. Other notable data analysis techniques that have not been used include process tracing, Qualitative comparative analysis (QCA), Geographic Information System (GIS), spatial analysis, experiments, and advanced statistical methods, including discriminant analysis, structured equation modelling, etc.

[8] Participatory rural appraisal

[9] Rapid Rural Appraisal

Figure 6: Research Methods

The sustainability of livelihoods during crises has been analysed by developing a coding framework using the theoretical approach discussed in the previous section. See Figure 1 and Appendix 1 in the Supplementary file. Five groups of variables have been analysed: a) livelihood outcomes, b) livelihood strategies, c) livelihood resources, d) culture, organisations, institutions & moderating political variables that affect livelihoods, and e) context.

Crisis is a contextual variable which affects the relationship among livelihood resources, livelihood strategies and livelihood outcomes. Crisis aspects of livelihoods have been analysed using four dimensions (Figure 1 and Appendix 1 in Supplementary file): a) Scale, b) Phases, c) Aspects, and d) Actor characteristics. First, consider scale (Figure 7): most crises have been analysed mainly at the subnational level (34 articles /91 articles), followed by analysis at the national level (30/91). 9 studies have been conducted at the supra-national level, 3 at the organisational level, and 2 at ecological scales (lake-level, estuary-level). 13 studies have yet to identify the scale of analysis explicitly. For studies conducted at the sub-national level, 6 studies have studied crises in urban areas, and 6 studies have studied crises in villages. Next, consider phases of crises: a) signal detection (25/91), b) preparation (13/91), c) response (66/91), d) recovery (18/91), and e) learning (21/91). Most of the

articles appear to focus on crisis response and signal detection phases. Studies on the preparation, recovery, and learning phases seem less common. Third, consider aspects of crises: magnitude of consequences (69/91), urgency (10/91), uncertainty (15/91), ambiguity (39/91), and complexity (10/91). Most articles have analysed the ambiguity of crises and the consequence-magnitude of crises. Analysis of urgency, uncertainty, and complexity is less common. Finally, consider actor characteristics: analysis of slack resources (50/91), strength of social relationships (52/91), and coping strategies (36/91) are common. However, analysis of actor crisis preparation (7/91) is less common. This is an exciting finding that overlaps with an earlier finding about the phases of crises. Among the five phases of crises, the preparation phase is characterised by the least amount of research. In other words, not only is there limited research on how actors prepare for future crises, but there is also a need for increased research on all other aspects of crisis preparation.

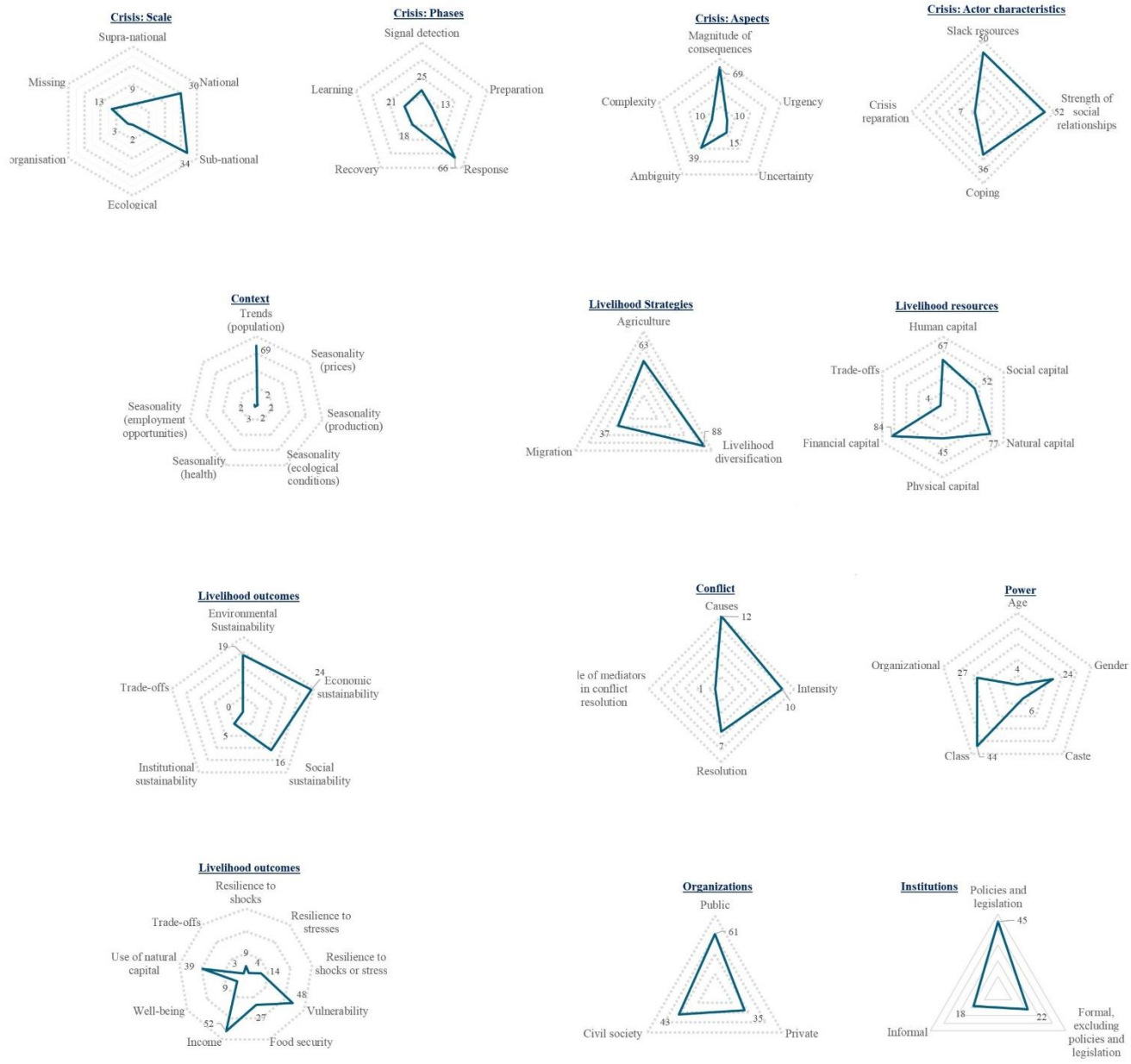

Figure 7: Sustainability of livelihoods during crises. See Appendix 2 in the Supplementary file for larger illustrations.

Other critical contextual variables include trends and seasonality (Figure 7). Trends are well-captured by articles under study - consider population trends: (69/91) articles contain information on this variable. However, seasonality needs to be captured adequately by the articles under study. Content analysis reveals that none of

the five types of seasonality analysed in this research - seasonal variation in a) prices (2/91), b) production (2/91), c) ecological conditions (2/91), d) health (3/91), and e) employment opportunities (2/91) – are characterised in detail by articles in the dataset.

However, livelihood resources as well as livelihood strategies are well characterised in the dataset (Figure 7). 6 kinds of livelihood resources have been analysed: a) Human capital (67/91), b) Social capital (52/91), c) Natural capital (77/91), d) Physical capital (45/91), and e) Financial capital (84/91). All of them are well-represented in the dataset. Livelihood resources are probably the most well-represented variables discussed in this article. However, trade-offs amongst livelihood resources (4/91) are scarcely represented. Livelihood strategies are well-represented, as well: a) Agriculture (63/91), b) Livelihood diversification (88/91), and c) Migration (37/91).

Amongst moderating variables, institutions and organisations are well represented; Power, Conflict, and Culture are not (Figure 7). 3 kinds of institutions have been analysed: a) Policies and legislation (45/91), b) Formal, excluding policies and legislation (22/91), and c) Informal (18/91). Institutions other than policies and legislation are characterised less frequently. 3 kinds of organisations have been analysed: a) Public (61/91), b) Private (35/91), and c) Civil society (43/91). Private organisations are characterised less frequently than public and civil society organisations. 2 kinds of political variables have been analysed: a) Conflict and b) Power. 4 dimensions of Conflict have been analysed: a) Causes (12/91), b) Intensity (10/91), c) Resolution (7/91), and d) Role of mediators in conflict resolution (1/91) – none are well represented. Power differentials due to five different sources have been analysed: a) Age (4/91), b) Gender (24/91), c) Caste (6/91), d) Class (44/91), and e) Organisational (27/91) – only one of the sources of power (class) appears to have been well characterised. Culture (19/91) is also minimally represented in the dataset.

A wide variety of livelihood outcomes have been analysed (Figure 7): a) Resilience of livelihoods to shocks (9/91), b) Resilience of livelihoods to stresses (4/91), c) Resilience of livelihoods to shocks or stresses (14/91), d) Vulnerability (48/91), e) Food security (27/91), f) Income (52/91), g) Well-being (9/91), h) Use of natural capital (39/91), i) Environmental Sustainability (19/91), j) Economic sustainability (24/91), k) Social sustainability (16/91), l) Institutional sustainability (5/91), and m) Trade-offs (3/91). Measuring livelihood outcomes in terms of vulnerability is more popular than resilience, security, well-being, or sustainability. Nonetheless, the most popular measure of outcome is income. Trade-offs amongst outcomes are rarely studied, especially in terms of trade-offs amongst different forms of sustainability (environmental, economic, social, institutional).

5. DISCUSSION

In this study, meta-synthesis of extant literature on sustainable livelihoods during crises was conducted in two stages: a) scientometric analysis and b) content analysis. Scientometric analysis reveals the need for globally coordinated efforts to research the sustainability of livelihoods during crisis. Although 102 articles have been published in this area until 2021, most authors appear to be working independently, and very few appear to have conducted sustained and focused research in this area. This probably explains the absence of interconnected, cross-cutting themes connecting various strands of literature on sustainable livelihoods during crises. Nonetheless, review articles on sustainable livelihoods during crises are scarce although: a) Some attempts have been made in recent years to conduct bibliometric and scientometric analysis of sustainable livelihoods (see Kumar et al. 2023 who review the extant literature on policy interventions for sustainable livelihoods); b) Some scholars have reviewed the effects of disasters on livelihoods (see Kwazu et al. 2021); and, c) the SLA has been used extensively for empirical research (see Pu and Chang-Richards 2022). However, the use of SLA for content analysis of extant literature on sustainable livelihoods during crises is a methodological innovation.

Content analysis reveals that research in this area is mainly qualitative and cross-sectional, oriented towards primary data analysis. In other words, there are few studies on the temporal aspects of sustainability during a crisis. This is probably because there is limited secondary information on crises, resulting in the absence of large datasets for causality-oriented quantitative studies on sustainable livelihoods during crises. The need for secondary data on crises can be attributed to the uncertainty associated with crises (Wolbers et al., 2021): since it is challenging to anticipate crises, it may be difficult to plan and create large, structured datasets over time. This problem is compounded by the fact that there isn't any specific framework to capture multi-dimensional data on crises. Consider, for example, the case of the COVID-19 pandemic: Each country has adopted its own framework for data collection and maintenance. This also probably explains why there is limited research on the preparatory phases of crises. Since preparation precedes detection, action during preparation may appear like routine life and thus may need more attention from researchers. In addition, the lack of quantitative research

(especially quasi-experimental or experimental research) indicates that causal relationships have yet to be tested thoroughly. For instance, there needs to be more information on the interconnections between the phases of crises (preparation, recovery, learning) and livelihood outcomes.

Causality-oriented research would have been easier to conduct if crises had been characterised more thoroughly. For instance, consider the characteristics of crisis managers that affect crisis outcomes: a) attention to environment, b) need for structure, c) time urgency, d) action vs. state orientation, e) seeing threat vs. seeing opportunities, and f) ability to rethink beliefs (Christensen & Kohls, 2003). Content analysis of the sustainability of livelihoods during crisis reveals minimal effort in characterising crisis managers and their effect on outcomes. For instance, consider the behavioural aspects of crisis managers, such as stigma or trauma. There is increased scope for research on such behavioural dimensions of crises, not just from the perspective of crisis managers but also for all stakeholders associated with the study of crises.

Next, consider event-related characteristics of crises: while the scale of crises and phases of crises appear well characterised in the dataset, there needs to be more information on whether the crisis is a one-time phenomenon or an ongoing event (Christensen & Kohls, 2003). The effect of crisis on livelihood outcomes may vary considerably based on such event-related characteristics: if livelihood resilience is high, then the impact of a one-time crisis on livelihood sustainability may be much less dramatic than the effect of a long-lasting, ongoing crisis.

The effect of crises on livelihood outcomes also depends on dimensions of Predictability / Influenceability (Gundel, 2005) and Onset / Closure (Boin et al., 2020). Using the dimensions of predictability and influenceability, crises can be categorised into 4 categories: a) Conventional: predictable and influenceable, b) Unexpected: unpredictable but influenceable, c) Intractable: predictable but uninfluenceable, and d) Fundamental: unpredictable and uninfluenceable. These 4 types of crises may have different effects on the sustainability of livelihoods because conventional crises are often one-off crises; interventions are known and can be rolled out rapidly. In contrast, fundamental crises are more complex, and preparedness is difficult to achieve (Gundel, 2005).

Similarly, crises can be categorised into 4 categories using the dimensions of onset and closure: a) Fast-burning: fast onset and fast closure, b) Cathartic: Slow onset and fast closure, c) Long-shadow: Fast onset and slow closure, and d) Creeping: slow onset and slow closure. Fast-burning crises are short-lasting: they require an immediate response under high uncertainty. In contrast, creeping crises fester for a long time and are characterized by ambiguity: they may change characteristics over time, and therefore, may require rapidly changing responses (Boin et al., 2020). Consequently, the effect of moderating variables such as culture, politics, power, and conflict on the sustainability of livelihoods may vary depending on whether the crisis is fast-burning, cathartic, long-shadow, or creeping.

Likewise, crises differ from each other depending on how factors (natural, technical, economic, political, institutional, social, internal, external) related to the origin of crises vary from factors associated with preventive action (Christensen & Kohls, 2003; Pearson & Mitroff, 1993a). Interesting research questions arise: which group of variables (livelihood resources, livelihood strategies, or livelihood outcomes) is most sensitive to variation in such factors? How does the effect of moderating factors (institutions, power, conflict, culture, and politics) change as the factors of origin or preventive action change? How do such differences affect the sustainability of livelihoods?

Moving from crises to the sustainability of livelihoods, one of the most important findings from content analysis is limited evidence of sustainability-related trade-offs or synergies amongst outcomes. Analysis of trade-offs is at the heart of the sustainability debate (Stiglitz et al., 2019; Nath & Arrawatia, 2022; Nath, 2018): how crises affect such trade-offs has significant consequences for the survival of our planet. For instance, are sustainability concerns sacrificed for immediate survival needs during crises? Or do crises enable synergies across livelihood outcomes? What drives these trade-offs or synergies? Are such effects transient or long-lasting? While some research suggests ecological impacts may be temporary, such as reduced CO2 emissions during pandemic lockdowns, economic and social effects often persist longer in sectors like tourism or hospitality (Le Quéré et al., 2021; Romagosa, 2020; Jones & Comfort, 2020). Research on livelihoods during crises studies various outcomes: resilience, vulnerability, security, income, well-being, and different kinds of sustainability. But limited efforts appear to have been made to answer questions such as: Do crisis managers prioritise the resilience of livelihoods, or do they seek to strengthen local adaptive capacity? Do different kinds of crises have differential impacts on various sorts of livelihood outcomes? What do the differential effects of crises on different types of livelihood outcomes tell us about governance for sustainability?

Another set of variables that have yet to be analysed well is feedback loops: the characterisation of feedback loops is rarely explicit. Analysis of feedback loops is necessary to better understand the temporal dimensions of sustainability governance during crises. How does learning from crises improve sustainability outcomes? Does learning lead to better preparation and signal detection? Agent-based modelling is an exciting research method that can be used to answer such research questions (Miyasaka et al., 2017).

Likewise, there is scope for further research on how political variables such as power and conflict moderate the relationship between crises and livelihood sustainability (Nath et al., 2020). Conflict can be characterised using dimensions such as a) causes, b) intensity, c) resolution mechanism, and d) role of mediation. The moderating effect of these dimensions on the relationship between crises and livelihood sustainability needs to be fleshed out. Increased clarity is also required on the differential impacts of varied sources of power (tribal, linguistic, ethnic, and religious).

Similarly, the role of varied organisations needs to be fleshed out. Organisations are often categorised into a) public, b) private, and c) non-governmental/community-oriented/civil society. However, certain kinds of organisations, such as the National Resistance Army in Zimbabwe, cannot fit neatly into such categories. Questions, therefore, arise as to whether the effect of such kinds of organisations on the relationship between crises and livelihood sustainability differs from that of pure-play public or private organisations. Similarly, consider monarchies: do public organisations behave differently from public organisations in democracies? Such questions can arise during the historical analysis of crises from the past.

Although transcontinental research networks exist, most research sites and crisis-focused studies are concentrated in the Global South. In contrast, most of the larger research hubs appear to be in the Global North. What does this tell us about Global North-South collaboration? Consider the 14 single-site articles focused on India: 9 of these articles are authored by scholars affiliated with organisations based in India; 4 articles are authored by scholars (probably of non-Indian origin) affiliated with organisations based outside India (Canada, Switzerland, South Africa, United States of America); only one article appears to be authored by a scholar of Indian-origin based out of a non-Indian organisation (University of East London, United Kingdom). This is a surprising finding since many Indian students pursue doctoral studies abroad. One likely explanation is that scholars of Indian origin are concentrated in engineering or natural science departments. Another likely explanation may be that scholars from the Global North work extensively with research partners from practitioner organisations from the Global South. Such practitioners may not have career incentives to co-author research articles in peer-reviewed scholarly journals. Nonetheless, this is an area for future research.

Livelihood resources are well-characterised in the research on the sustainability of livelihoods during crises. However, physical capital is the least studied among the different kinds of capital. In sustainability literature, physical capital is often conceptualised as socio-technical systems or man-made infrastructure (Ostrom, 2009). The relationship between crises and livelihood sustainability may vary according to the crisis sector. Different kinds of sectors are associated with various types of socio-technical systems: for instance, land-water dynamics is controlled by polders and embankments, which are often the first point of analysis for understanding the effect of natural crises such as cyclones (Nath et al., 2021); Similarly, financial crises are closely associated with information technology (IT) infrastructure of banks (Illing & Liu, 2006). Further research on physical capital may enable increased elucidation of the interconnections between the crisis sector, livelihood sustainability and socio-technical systems.

The interconnections between crisis and sustainability may depend on the nature of the actors (Ardelt, 1998), households (Moser, 1998), organisations (Huang, 2008), governing entities (Rivolin, 2017), society (Castells, 1983) or other levels of conceptual aggregation. For instance, consider households: while all households suffer during crises, marginalised households bear the brunt of suffering (Butler & Adamowski, 2015; Nath et al., 2021). Crises enshrine systemic inequalities, resulting in a vicious cycle of increasing vulnerability amongst those who are the most vulnerable (HLPE, 2020; Staddon et al., 2020) as access to resources is severely constrained under such circumstances (Nath et al., 2021) – in other words, the interconnections between crisis and sustainable governance may depend on inter-household equity. Similarly, how different kinds of organisations respond to a crisis often depends on the nature and type of crisis (Parameswar et al., 2020). Organisations have increasingly sought sustainable outcomes in recent years by pursuing collective ecological, social, and governance goals (Rajesh & Rajendran, 2020; Galbreath, 2013). Such attempts at sustainable governance are often moderated by organisational culture, mission, vision, and values (Mohrman & Worley, 2010; Nath & Arrawatia, 2022). However, until recently, studies connecting crisis to organisational sustainability were limited in the literature, suggesting the need for further research at the intersection of crisis and sustainability.

Sustainability research seeks to understand how humanity can "meet the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Sustainability research is vast and ever-expanding. Drawing on Clark and Harley (2019), we present six promising new avenues for research in this area: a) analysis of reciprocal linkages between environmental systems & human (including organisational) systems (Ostrom, 2009; Hull & Liu, 2018); b) measurement of sustainability outcomes (well-being, resources, capital assets, inclusive wealth, profitability, organisational sustainability) & trade-offs amongst such outcomes (Stiglitz et al., 2019); c) equity, power, justice and strategies for empowerment (Gaventa, 2020); d) risk, vulnerability, resilience & determinants of adaptive capacity (Bruijn et al., 2017); e) innovation & transformations (Fagerberg, 2018); and, f) institutional fit and governance (Young, 2017).

Framing research questions in this manner facilitates the exploration of different dimensions of crisis in different contexts wherein the interconnections between crisis and sustainability may vary according to context (see Table 1).

Table 1: Research Questions

Theme	**Dimension**	**Research question**
Crisis characterization and temporal dimensions	Crisis typology	How do different crisis types (conventional, unexpected, intractable, fundamental) affect livelihood sustainability outcomes?
	Crisis temporality	What are the differential impacts of fast-burning versus creeping crises on livelihood resilience and adaptive capacity?
	Crisis phases	How do the interconnections between phases of crises (preparation, recovery, learning) influence livelihood outcomes?
	Multiple crisis	How do compounding or cascading crises affect the sustainability of livelihoods compared to single-event crises?
	Actor characteristics	How do crisis managers' characteristics (attention to environment, need for structure, threat vs. opportunity orientation) influence sustainable livelihood outcomes?
Livelihood resources and capital	Physical capital	How do different socio-technical systems mediate the relationship between crisis sectors and livelihood sustainability?
	Capital trade-offs	How do households reallocate resources across different capital types during various phases of a crisis?
	Temporal changes	How do different forms of capital transform and interact over the course of a crisis event?
	Marginalized access	How do crisis-induced resource constraints affect different groups' access to livelihood capitals?
	Technology	How does technology influence access to different forms of capital during crisis?
Livelihood strategies and adaptations	Strategy evolution	How do livelihood strategies evolve across different phases of a crisis?
	Diversification effectiveness	How effective are different diversification approaches in maintaining livelihood sustainability during various types of crises?
	Migration patterns	How do migration patterns differ during fast-onset versus slow-onset crises?
	Agricultural adaptations	What agricultural adaptations prove most effective for different crisis types and contexts?
	Strategy trade-offs	What trade-offs do households make between short-term coping and long-term adaptability when selecting livelihood strategies during crisis?
Livelihood outcomes and sustainability dimensions	Outcome trade-offs	What sustainability trade-offs emerge during different phases of crisis?
	Differential impacts	How do different types of crises affect various livelihood outcomes (resilience, sustainability, security, income)?
	Vulnerability patterns	How do crisis events reshape vulnerability patterns among different household types?
	Feedback loops	How do feedback loops between livelihood outcomes influence future crisis preparedness?

	Outcome prioritization	How do crisis responders prioritize between different sustainability outcomes (environmental, economic, social) during resource-constrained periods?
Institutional and political dimensions	Power dynamics	How do power dynamics shift during different phases of a crisis and how does this affect livelihood outcomes?
	Conflict	How do different dimensions of conflict (causes, intensity, resolution mechanisms) moderate the relationship between crises and livelihood sustainability?
	Organizational responses	How do different types of organizations (public, private, non-governmental, hybrid) influence livelihood sustainability during crisis?
	Cultural mediation	How do cultural factors mediate household and community responses to crisis events?
	Institutional fit	How do institutions adapt to provide better governance fit for different crisis phases?
Methodological research approaches	Longitudinal studies	How can longitudinal research designs better capture the temporal aspects of livelihood sustainability during crisis events?
	Causal analysis	What quasi-experimental approaches can be used to establish causality between crisis characteristics and livelihood outcomes?
	Agent-based modeling	How can agent-based modeling improve our understanding of feedback loops in crisis-affected livelihood systems?
	Mixed methods	What mixed-method approaches can best capture both quantitative outcomes and qualitative experiences of households during crisis?
	Data frameworks	How can standardized data collection frameworks be developed for crisis events to enable cross-comparative analysis?

Future research on sustainable livelihoods during crises needs to analyse interconnections between the varied dimensions of crisis and sustainability outlined above. There is a need to develop generalisable propositions on sustainability during a crisis, irrespective of the type of crisis. For instance, consider the various phases that characterise a crisis: signal detection, preparation, prevention, mitigation, response, recovery and learning (Pearson & Mitroff, 1993a). Several interesting research questions can be framed by linking the phases of a crisis to the six avenues for sustainability research discussed earlier: a) Analysis of reciprocal linkages between human & environmental systems: in a coupled human-environmental system, do different phases of a crisis have a differential impact on human systems vis-à-vis the coupled environmental system? b) Measurement of sustainability outcomes: Do trade-offs in outcomes vary according to the phases of a crisis? c) Equity, power, justice, and strategies for empowerment: How do power dynamics change according to the phases of a crisis? d) Risk, vulnerability, resilience & determinants of adaptive capacity: do residents adopt different coping strategies for adapting to different phases of a crisis? e) Innovation & transformations: How does organisational innovation change as a crisis transitions from one phase to another? f) Institutional fit and governance: How do institutions (types of lockdown) change according to the phases of a crisis?

6. CONCLUSION

This study synthesises the extant literature on the sustainability of livelihoods during crises to argue that while the topic has garnered increasing scholarly attention, research efforts remain fragmented, with limited collaboration among authors, organisations, and countries. This lack of a cohesive global research program has resulted in a field characterised by isolated studies rather than interconnected, cumulative knowledge-building.

Using the Sustainable Livelihood Approach (SLA) as a theoretical framework has enabled the nuanced analysis of how crisis, conceptualised as a multi-dimensional contextual variable, affects livelihood sustainability. Using the SLA as a framework for meta-synthesis is a methodological innovation for two reasons: a) traditionally, the SLA has been applied as an analytical tool for empirical fieldwork, project planning, or policy evaluation. In this study, however, the SLA has been used as a meta-analytical framework to systematically code, categorise, and synthesise findings from a diverse body of literature on sustainable livelihoods during crises, allowing for cross-comparison and the identification of patterns and gaps that would otherwise have remained hidden; b) In addition, by conceptualising crisis as a contextual variable with multiple

dimensions, this study extends the scope of the SLA beyond its conventional focus on vulnerability (shocks and stresses) to analyse the effects of crises on the sustainability of livelihoods.

The key implications of this study for scholars are: first, it highlights the need to examine in a focused manner the effects of crises on livelihood sustainability. This is because there is limited research on this theme and the nitty-gritty of the above relationship. Second, this study has established the scope for future research in this area by outlining possible research questions for further exploration. Third, this review is among the first few studies that analyse the interconnections between crises and sustainability. This study, therefore, acts as a starting point for more systematic reviews, meta-analyses, and meta-synthesis in this field. For practitioners and policymakers, this study thoroughly synthesises the extant literature on crises and livelihoods. It should, therefore, serve as a solid foundation for informed decision-making when the next crisis hits humanity, and policymakers need to make critical decisions on livelihoods and sustainability. For instance, this review reveals that informal livelihood strategies need to be formalised in Zimbabwe by integrating informal sectors into legal frameworks by providing licenses for artisanal mining, coupled with training on sustainable extraction and occupational safety. Similarly, a review of Indian studies reveals the need for multi-sectoral collaborations by creating district-level crisis-response task forces. For the rest of the world, crisis preparedness can be strengthened via local adaptation planning and creation of large data-sharing mechanisms for equity-oriented crisis response.

AUTHOR CONTRIBUTIONS

Sanchayan Nath contributed to the first part of this manuscript at the Indian Institute of Technology in Tirupati, India. He then switched jobs and finished writing the manuscript with **Nakul Parameswar** while working at XLRI Xavier School of Management, Delhi-NCR Campus, India. Both authors contributed equally towards article conceptualisation, theory development, data processing, data analysis, writing and revisions.

DECLARATIONS

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