



The Role of Insurance Mechanisms in Managing and Mitigating Financial Losses From Climate-Related Catastrophes: A Systematic Review

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Abbreviation	Standard Expansion
ASP	Adaptive Social Protection
CAR	Contractor's All Risk
CBHI	Community-Based Health Insurance
CCRIF SPC	Caribbean Catastrophe Risk Insurance Facility - Segregated Portfolio Company
CEM	Clean Energy Management
CIB	Climate-Index-Based Insurance
Climigration	Climate + Immigration
CSA	Climate-Smart Agriculture
CST	Cyclone / Storm / Tempest
DRF	Disaster Risk Financing
DRM	Disaster Risk Management
ERM	Enterprise Risk Management
ESG	Environment, Social, Governance
EWS	Early Warning System
IBCI	Index-Based Crop Insurance
IBI	Index-Based Insurance
IIB	Insurance Input Bundles
ILS	Insurance-Linked Securities
IoT	Internet of Things
MCPD	Multidimensional Climate-Poverty Dynamics
NBI	Nature-Based Insurance
NBS	Nature-Based Solutions
NDVI	Normalized Difference Vegetation Index
NPD	New Product Development
PDSI	Palmer Drought Severity Index
PPP	Public-Private Partnerships
RBC	Risk-Based Capital
RBP	Risk-Based Pricing
RPM	Ruin Probability Model
Seismic Risk	Hazard + Vulnerability + Exposure (Mainly on Earthquakes)
SIDS	Small Island Developing States
SPEI	Standardized Precipitation Evapotranspiration Index
SPI	Standardized Precipitation Index
UBI	Usage-Based Insurance
WII	Weather Index Insurance

Abstract

The purpose of this study is to evaluate the role of insurance mechanisms in managing and mitigating financial losses from climate-related catastrophes in a global context. The study is segregated into three main parts to discuss: the general concept of a literature review and its purpose in a research paper in doctoral level, especially in a doctoral-level study, in PART 1; the annotated bibliography table that summarizes the data gathered from the study as PART 2; and the explicit discussion regarding the research topic as PART 3. The complex nature of the research topic and the unpredictable nature of climate-related catastrophes mean that the frequency and severity of the damage are uncertain. Hence, the available empirical data become rapidly outdated, and continuous research should be conducted to validate relevant scopes of the studies. Accordingly, the researcher has conducted a systematic literature review following the PRISMA-2020 guidelines to browse relevant data from several data sources. Google Scholar and Consensus have mainly contributed to screening data aligned with the exclusion and inclusion criteria, and the final data sources have been collated in a table. This bibliography table has been designed to address every research objective developed to conduct the study, and risk-transfer theory and climate-risk and resilience theory have been explicitly discussed as the most relevant theoretical foundations used to elaborate the insurance mechanisms and their dimensional functions in managing and mitigating financial losses due to climate-related catastrophes. The esoteric scope of the study contains a number of theories and technical models providing the theoretical and rigorous foundation for the concepts, mechanisms, and resilience strategies pertaining to the scope of the study. Therefore, the author has abbreviated every theory involved in the bibliography table as footnotes. The three research objectives have navigated the study to find the types of different insurance mechanisms and their functional dimensions, the role of insurance in mitigating and managing financial losses, and the economic-vulnerability indicators that impact the speed of financial recovery from a climate-related catastrophic event.

Keywords : Climate-related catastrophes, insurance-mechanisms, financial-losses, role of insurance, economic-vulnerability

PART 1

Conceptual Overview of Literature-review

1. Background of Literature-review

A literature review provides the intellectual context for addressing a research problem. It is not merely a summary of prior studies but a critical and comprehensive engagement with empirical work across philosophical and methodological traditions (Rocco & Plakhotnik, 2009). Wallace and Wray argue that postgraduate-level reviews should emphasise the limitations, strengths, and weaknesses of existing studies rather than simply restating what authors aimed to prove (Wallace & Wray, 2011). Thus, a literature review clarifies what is already known about the research problem, what requires further comparison, and what remains to be demonstrated. It also reflects the researcher's depth of knowledge and conceptual development, positioning the study within a broader intellectual landscape and enabling engagement with other scholars (Hart, 2018). Creswell notes that the literature review forms the foundation of research design by linking research questions to prior scholarship (Creswell & Creswell, 2017). It shapes theoretical perspectives, methodological choices, and the interpretation of findings, thereby helping to justify the research gap. At doctoral-level, researchers must demonstrate critical thinking and originality, and the literature review is central to this. It requires identifying gaps in previous studies and addressing them through coherent, evidence-based arguments that support the chosen research problem (Machi & McEvoy, 2021).

2. Definition of Literature-review

Based on the interpretations of previous veteran scholars, the literature review, at its fundamental level, is considered a critical examination of previous knowledge synthesized with the research problem (Creswell & Creswell, 2017; Hart, 2018; Machi & McEvoy, 2021; Rocco & Plakhotnik, 2009). According to Hart (2018), the literature review is an intellectual process that gathers data from an annotated bibliography or information summary. The purpose of this exercise is not merely to locate the literature but to evaluate how productively it has contributed to academia with valid knowledge. As Wallace and Wray (2011) define, the literature review at the doctoral level should be argued and questioned for its assumptions, evidence, what has been written, the contribution of the article, and its openness to challenge limitations. Another concept of the literature review highlighted by Ridley (2012) is that it is a structured process that facilitates other researchers in identifying the main themes related to their research area and debating the surrounding issues to support the researcher's own study. Machi and McEvoy (2021) define literature reviewing as an analytical and organising activity that leads to a chain of activities from identifying the research problem to finding, organising, and analysing relevant facts in the literature in a coherent and rigorous manner. These definitions highlight four main features of the literature review as critical, relevant, synthesis, and specific purpose, which demonstrate the importance of the literature review.

3. Purpose of the Literature-review

The purpose of the literature review could be discussed through several important aspects which have a direct impact on the research process due to its nature of interconnectivity. The literature review academically validates, conceptualizes, justifies, and develops the study. Through previous empirical studies, the literature review establishes the current position of the research problem examined through earlier empirical papers and scholars (Frank & Hatak, 2014). Further, it leads to emerging research areas with new knowledge. The literature review also identifies gaps in existing knowledge, which areas need to be developed, and which philosophical perspective should be applied (Almusaed et al., 2025). Further, the systematic review will determine how additional and valid information productively contributes to the research problem. At doctoral level, research should be intellectually qualified with valid and acceptable theories and concepts (Hart, 2018); therefore, developing theoretical and conceptual foundations proves that the study is not isolated and is open for academic debates (Rocco & Plakhotnik, 2009). Another aspect is that the literature review informs the research objectives and questions in a more formulated manner and refines the dimensions of the study (Templier & Paré, 2015). The literature review provides insights into previous scholarly work and methodologies, which offer different perspectives to the new research topic through quantitative, qualitative, and mixed-method approaches (Creswell & Creswell, 2017). Ultimately, the main purpose of the literature review is to bridge the gap between existing academic knowledge and future research areas.

4. Significance of Literature-review

The key significance of the literature review is how strongly it establishes the academic rightfulness and the intellectual root of the study, which also demonstrates the stance of the existing philosophical position and knowledge. According to Hart (2018), the literature review provides academic contextualization, which deeply supports understanding of the theoretical and empirical background of existing knowledge. Secondly, the literature review provides the platform to demonstrate the ability of critical thinking and articulation skills of the researcher (Wallace & Wray, 2011). Thirdly, the literature review enables the researcher to avoid duplication in previous studies, allowing the opportunity to seek emerging and potential research areas (Oliver, 2012). Fourthly, the literature review especially reinforces the philosophical position of qualitative research in the broader spectrum of its theoretical, epistemological, and methodological arguments (Denzin & Lincoln, 2011).

5. Types of Literature-review

It has different approaches allowing the researcher to investigate the information aligned with the specific research problem, purpose, methodology, and scope. There are several types of literature reviews, namely narrative, systematic, scoping, mapping, and meta-analysis, which are widely used in academia.

5.1 Narrative (Traditional) Literature-review

Narrative-review or traditional Literature-review, is comprehensive and critical writing about a specific research area, which allows a greater flexibility in narrative format rather than a systematic and scientific manner (Sukhera, 2022). Depending on the research problem the researcher is always free to demonstrate Literature-review; thematically, chronologically, conceptually or theoretically (Efron & Ravid, 2026). The narrative approach is more suitable when the research problem has a vast scope, context and the researcher's purpose to critically understand the research problem rather than answering a research question (Overcash, 2003). In narrative-review, it is not merely highlighting what authors have mentioned in relevant study area, but to emphasis the contradictions, relationship between the patterns, and unresolved debates (Esin, 2014). Narrative-review specifically providing a qualitative effort to the study focusing on the relevant research topic while setting the inclusion and exclusion norms of the study in a proper methodological manner (Jones, 2004). According to (Onwuegbuzie & Frels, 2016), there are four common types of narrative-review; general, theoretical, methodological and historical (chronological). Narrative-review guides the researcher in a gradual scientific process which allow him to explore vast knowledge in a specific study further directing for future research potentials. Further narrative-review organises data to identify the research gaps and to direct to a specific contextual research area, analyses the data following the scientific method of SPIDER model¹.

5.2 Systematic Literature-review (SLR)

SLR is used to collect secondary data (Manu & Akotia, 2021). An SLR differs from the narrative literature review as the SLR is derived with a specific and intentional research purpose. The collected data will be in the research study, which includes identifying information types such as policies, journals, articles, and books. Further, it systematically establishes the research inclusion criteria, such as the scope of the review, types of data, and the validity of the information. According to Papaioannou et al. (2016), the SLR is an organised method of synthesising and evaluating required secondary data, which is strengthened by other research methods for its transparency and reproducibility (Cabrera, 2023). SLR follows the following interconnected flow. The PICO-framework² guides how the questions are asked from the literature by breaking them into population, intervention, comparison and outcome. PROSPERO³ highlights how the information is registered in the literature, usually in an annotated bibliography table. The PRISMA guideline is formatted to drive the data-filtering process. Since the main research problem will be reviewed and evaluated according to the SLR approach, the comprehensive application of the process is further discussed in PART 3.

¹ SPIDER – sample, phenomenon of interest, design, evaluation, research-gap

² PICO – patient / population, intervention, comparison, outcome

³ PROSPERO =free international prospective registry for systematic review (Mitchell, 2026)

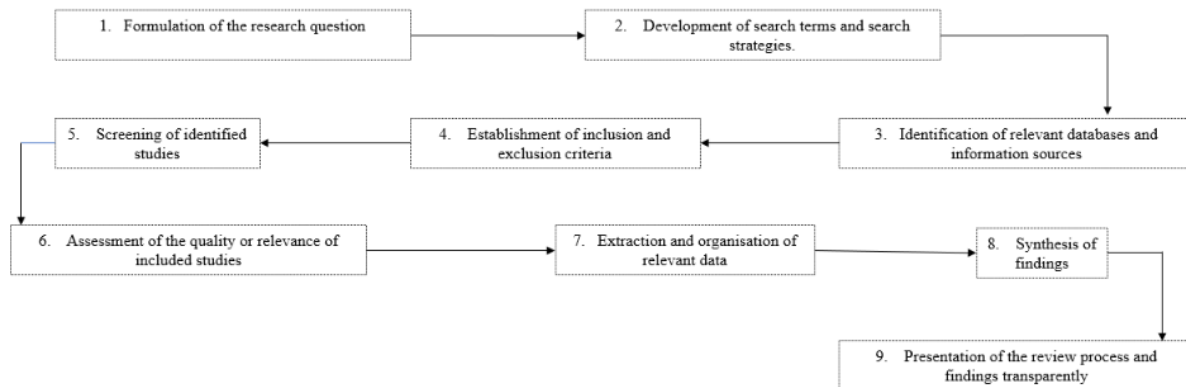


Figure 1. Systematic-Literature Review Process

5.3 Scoping Review

A scoping-review is preliminary assessment of potential size and scope of available literature, and it aims to identify nature and context of the research evidence, including ongoing research (Khalil, et al., 2016). The specialty of scoping-review is that systemic exploring of evidence-base synthesis (Trape, et al., 2025) which provides more breadth (Pham, et al., 2014), range, and specified characteristics (Bergschold, et al., 2024) in a relevant research field, but does not merely focused on the RQ or the specified research problem. Scoping-review is much appropriate for studies derived in multidisciplinary (Shao, et al., 2019), and conceptually complicated by different types of evidence of any study. Often, scoping-review maps literature to find the relationship of evidence in breadth by evaluating key concepts, knowledge and theories in empirical papers. Literally scoping-review contains all the literature sources available, including the gray-literature (Pollock, et al., 2021) and every source that will provide sufficient evidence for the study, including government reports, conference papers and clinical trials, etc. Compared to systematic-review, even though the eligibility criteria in scoping-review is clearly set before the review, they may be revisited throughout the process due to its iterative nature (Mak & Thomas, 2022). The appraisal of the data in literature may be rigorous in systematic but in scoping it could be like narrative or variable depends on the scope of the study. In the scoping-view, the designing of the RQ follows the PCC framework⁴ and the PRISMA-ScR⁵, 2018 flow chart (Lew, et al., 2022).

⁴ PCC -Population, concepts, context

⁵ PRISMA-ScR - the extension of PRISMA for Scoping-Review

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PART 2

Annotated Bibliography – Systematic Literature-review Data Recording Table

Index	Author(s) & Year	Title	Country / Disaster Context	Key Findings							Methodology	Theoretical Lens	Limitations / Gaps in data
				Type of Climate Catastrophe	Insurance Mechanism (RO1)	Dimensions of Insurance Mechanism (RO1)	Financial Loss Management Outcomes (RO1)	Economic Vulnerability Indicators (RO3)	Speedy-Recovery Factors (RO3)	Role of Insurance (RO2)			
001	(Albrecher & Loisel, 2026)	Climate-related-physical risks	Global / actuarial	Natural-perils	Reinsurance / Parametric / RBP	Parametric-triggers-pay-out / insurance-modelling	post-disaster-financial-volatility / insurer-solvency	Low-insurance-penetration / Climate-hazards	Parametric / Reinsurance	Financial-resilience	Conceptual	RMT ⁶	Empirical-data
002	(Aldridge & Bell, 2025)	Extreme-weather	New-Zealand	Natural-perils	RBP	Risk-based zoning and mapping	Claims-frequency / severity	Flood-prone area / infrastructure Fragility	Parametric	Central-resilience-mechanism	SLR	CRMT ⁷ / DRR ⁸	Data long-term insured losses
003	(Ali, 2026)	Sustainable-risk-governance	Saudi-Arabia	Rainfalls / Heatwaves	ESG-practices / RBP	Regulatory-governance / RBP	Regulatory-reforms / Reinsurance	Regulatory-gaps / Urbanisation	Strong-governance	Pillar in UAE’s climate-risk.	SLR	RTT ⁹ / ESG&ST ¹⁰	Empirical-data / depend on only secondary-data.
004	(Anshuka & White, 2025)	Flood risk and housing-price	Global	Flood	RBP	RBP-adjustments	Declining property values	Infrastructure fragility	RBP	Indirect role in resilience	SLR	RTT ¹¹ / DRR	longitudinal studies
005	(Apau & Sibindi, 2025)	Sustainable finance and insurance	Africa	Natural-perils	Microinsurance / RBP	Insurance value-chain / Stakeholder-engagement	Microinsurance reduces low-income household	Agriculture-dependant community	Microinsurance	Central-resilience mechanism	Narrative	SFT ¹²	Empirical-data
006	(Atlasi, et al., 2025)	AI-applicability	Global	----	AI based UW	AI-driven-pricing	Improved claim-settlement	Poor digital-infrastructure	AI-claim-settlement	Improving risk-assessment	Mixed	DTT ¹³ / TOE / TAM	Database coverage
007	(Awah & Ogundej, 2026)	DRR	Global	Natural-perils	Risk-transfer mechanisms	Incentivising risk-reducing behaviour	Disaster-related financial losses	Poor insurance-penetration	Private sector accelerates	Reduces financial shocks	SLR	DRR / R&ST ¹⁴	Empirical data
008	(Ayadi & Y. Forouheshfar, 2025)	Climate-change through AI	Global	Natural-perils	Parametric / AI-based-UW	AI-driven-pricing	Positive economic outcome as AI-risk-evaluation	Limited fiscal-capacity for lower-income-levels	AI-claim-settlement	AI-financial-recovery tool	SLR	CRT ¹⁵ / AI&DTT ¹⁶ / DRR	Empirical-validation in AI tools.
009	(Ayompe & Epie, 2025)	Building Climate-resilience	Africa	Natural-perils	IB-Agri / Climate-risk / Microinsurance	Climate-adaption-financing / PPP	Impact on livelihood losses / Supporting agricultural-stability	Self-perpetuating vulnerability factors	Microinsurance		SLR	CRT / DRR	Empirical-data / depend on only secondary-data.
010	(Bani, 2026)	Financing Policy-Disaster-Risk	Indonesia	Natural-perils	Parametric / Risk-pooling	Regulatory-Framework	Post-disaster Government fiscal burden	Poverty / Low insurance penetration	Parametric settlements	financial shock-absorber	Narrative	DRFT ¹⁷	Empirical data
011	(Barrage, 2025)	Climate change impacts	Global	Natural-perils	ILS / Catastrophe-risk pools / Reinsurance / Parametric	Risk-transfer-mechanism	Reduce-fiscal-shocks / Support-budget-stability / Provide-rapid-liquidity	Weak-infrastructure-resilience	Depend on fiscal-buffer	Liquidity-provider	Narrative	CFRT ¹⁸ / DRR	empirical data -fiscal-impacts in low-income countries
012	(Beaussier, Cabane, Chevalier, & Giry, 2026)	Social-protection & environmental-risks	Europe	Natural-perils	Parametric / Risk-transfer-mechanisms	Risk-assessment / Climate-adaptation-policy	Fiscal-sustainability /Effective-insurance-protection / Social-protection	Locality of high-risk / Underinsurance	Speedy	Providing-liquidity	Narrative	Welfare-state theory / CRGT ¹⁹ / IRT ²⁰	Limited quant. Evidence more conceptual.
013	(Belgacem, Gafsi, Mazzitelli, & Ed-Dafali, 2026)	Green-insurance	Global	Environmental	Green-insurance	Renewable-energy-adoption	Renewable-energy / Corporate-financial-resilience	Limited-access / Regulatory-gaps / Dependence on fossil-fuel sectors	Improves-recovery	Promotes sustainable products	SLR	SFT	Green-insurance data across countries

⁶ RMT= Risk-modelling theory
⁷ CRMT = Climate-risk modelling theory
⁸ DRR = Disaster Risk Reduction
⁹ RTT = Risk-transfer Theory
¹⁰ ESG&ST = Environment-social-governance & sustainability theory
¹¹ RPT = Risk perception theory
¹² SFT = Sustainability finance theory
¹³ DTT = Digital transformation theory | TAM = Technology acceptance model | TOE = Technology-organisation-environment framework
¹⁴ R&ST = Resilience & Sustainability theory
¹⁵ CRT = Climate-resilience theory
¹⁶ AI&DTT = Artificial intelligence & digital transformation theory
¹⁷ DRFT = Disaster risk financing theory
¹⁸ CFRT = Climate fiscal risk theory
¹⁹ CRGT = Climate risk governance theory
²⁰ IRT = Institutional resilience theory

014	(Belmahi & Jabari, 2025)	Climate-Risks & Financial-Markets	Global	Natural-perils & Carbon	Catastrophe-risk-transfer-mechanisms	Risk-transfer tool	Asset-price-volatility / Corporate-default-risk / Market-uncertainty	High-exposure in climate-shocks / Dependence on carbon-intensive-sectors	Credit-risk / recovery improves	Supports financial-market stability	Narrative	CFRT	Empirical evidence
015	(Bill-Weilandt, Lallemand, Chan, Patel, & Hamel, 2026)	Nature-positive-climate risk	Global	Natural-perils	IBI / Risk-transfer / ILS	Eco-system-services / pricing	Controlling financial-losses / recovery-methods	Climate-sensitive-sectors & communities	IBI	Supports nature-based conversions	SLR	CRGT / SFT/ ESG&ST	Empirical-evidence / Data-scarcity
016	(Chuah, et al., 2026)	Fisheries-Risk-Management	Malaysia	Seas & Extreme-weather	Risk-transfer-mechanisms	Risk-perception / Regulatory-environment / Cultural-attitudes	Confidence in fishing activities / Reduces liability burdens	Low-income among fishermen / maritime-hazards	IBI	Supports-maritime-risk-governance	Narrative	RPT ²¹ / LRT ²²	Empirical-data / depend on only secondary-data.
017	(Cimbru, Wagner, & Zeier Röschmann, 2025)	IoT & Insurance	Global	Natural-perils	UBI / Parametric / Telematics	Risk-assessment / Claims-management	Early-risk-detection / Managing-claim-ratios	Infrastructure- fragility for IoT & Digital-devices	Parametric-settlements	Major-role resilience	SLR	RMgT ²³ / DTT	Data-privacy and low empirical-evidence
018	(Codal, 2026)	Risk-Transfer, Resilience, and Capital-Allocation	Global	Natural-perils	Risk-transfer-mechanisms / ILS	Risk-pooling & diversification	Climate-adapted projects	Infrastructure-deficits	ILS	Reduces economic-vulnerability	Narrative	RTT / R&AT ²⁴	Empirical-data / secondary-data dependency.
019	(Dhungana, 2025)	Insurance for uninsured	South-Asia	NP / Agri / Live-stock	Social-insurance / microinsurance / PPP	Accessibility / affordability / distribution & governance	Recovery of post-disaster hardships	Low-financial-literacy	Microinsurance / PPP	Microinsurance	SLR	FIT ²⁵ / IIT ²⁶ /MIT ²⁷	Gaps in uninsured population & empirical-evidence
020	(Fligstein & Huang, 2025)	Institutional investors & bonds	Global	Natural-perils	Parametric / ILS / Risk-Transfer	Green-bonds / Reinsurance / pricing	Reinsurance-stabilises-insurer-solvency / Infrastructure-repair burdens	Regulatory-harmonisation /	ILS / Green-bonds	Supports recovery	Comparative	SFT / IIT	Empirical-data / secondary-data dependency.
021	(Giovanni, Kurniasari, Witantri, Aprilia, & Sugiharti, 2025)	Climate-resilience	Asia-Pacific	Natural-perils	Parametric / ILS / Microinsurance	Risk-evaluation / Payout-processes	Risk-pooling / Resilience-strategies	Fragmented coordination between agencies	ILS & Parametric-payouts	Reduces-vulnerability	SLR	SFT / R&AT/ DRR	Variability in parametric-insurance design / lack of empirical evidence
022	(Gopal, et al., 2026)	Climate-vulnerability & resilience	South-Asia	Natural-perils	IBI / Sovereign-risk-transfer-instruments / Parametric	Risk evaluation & Claims-management	Government-fiscal pressure	Livelihood / Poverty / Underinsurance	Parametric pay-outs	Major-resilience-strategy	SLR	R&AT / DRR	Empirical-evidence
023	(Gosaa & Wubieb, 2025)	IB-Crop Insurance	Ethiopia	Drought / Flood / Rainfall	IBCI / Microinsurance / PPP in Agri	Climate-based-risk-evaluation / Partnerships with NGOs	Income-shocks / vulnerability in crop-failure	Low financial-literacy / Soil degradation	IBCI / Microinsurance	Major-resilience-strategy	Narrative	RLRT ²⁸ / Agr-RMT ²⁹	Evidence gap-rainfall
024	(Grover & Kahn, 2026)	Resilience to climate change	Global	NP / Environmental-pollution	Market-based insurance	Access / affordability	Stability in operation / Investment in technology	Sectoral vulnerability / Lack of infrastructure	MIB	Supports-adaption	Comparative	FDT ³⁰	Under-representation of informal-sectors
025	(Han, et al., 2026)	Climate-economics and finance	Global	Natural-perils	Parametric / Reinsurance / ILS /PPP	Underwriting-risk-analysis / Government-frameworks	Speedy-payouts / Stability of financial-systems	Underpricing-Infrastructure / Limited access to finance / climate-sensitive-livelihoods / Institutional-vulnerability	Parametric / Reinsurance	Major-resilience-strategy	SLR	CET / RTT / RA&RT	Under-representation of micro-level climate-finance studies / Secondary-data-dependency
026	(Harangody, 2026)	Insuring-reef	Global reef systems	NP & Marine-Risks	Parametric-reef-insurance / PPP / Risk-transfer for	Risk-assessments / mitigation / control	Destruction of livelihood-tools / Indirect-economic-losses / Increased household-expenditure	Cyclone- damage / Ocean-acidification / Loss of biodiversity on reef-based-tourism /	Parametric-payouts	Provides immediate liquidity for reef-restoration	Conceptual	CR&AT ³¹ / SE&RT ³²	Data-gaps in ecological-monitoring / Heavy-reliance on case-studies

²¹ RPT = Risk perception theory

²² LRT = Livelihood resilience theory

²³ RMgT = Risk management theory

²⁴ R&AT = Resilience & adaption theory

²⁵ FIT = Financial Inclusion Theory

²⁶ IIT = Inclusive-insurance theory

²⁷ MIT = Microinsurance theory

²⁸ RLRT = Rural livelihood resilience theory

²⁹ Agr-RMT = Agriculture risk management theory

³⁰ FDT = Firm dynamics theory

³¹ CR&AT = Climate risk & adaption theory

³² SE&RT = Socio-ecological & resilience theory

					public-trust-ecosystems			Fisheries reliant on reef-ecosystems					
027	(Hemmati, et al., 2025)	Homeowners-insurance	US	Natural-perils	Risk-transfer / Residual-market-mechanisms / Reinsurance / Co-insurance	Underwriting / Co-insurance / Reinsurance risk-assessment	Liquidity for rebuilding / Stability of local-economies	Premium-unaffordability	Coverage-dependant	Financial-resilience	Policy-focused-analysis	IMT ³³ / RTT	long-term insurer-withdrawal data
028	(Ho & lyke, 2026)	Climate-change, resilience in SME	Global SME-context	Natural-perils	Risk-transfer-mechanism / Microinsurance	NPD	Asset-damage / revenue-losses / Increase national-operational-cost	limited credit-access / financial-buffers / climate-sector-dependence	Recovery is possible with insurance but not quantified	SME-financial-recovery	SLR	CRT / SME-development theory	Secondary-data dependence
029	(Hobday, et al., 2025)	Insurance for fisheries & aquaculture	Global fisheries and aquaculture	Marine-heatwaves / cyclones	Parametric / IBI / PPP	Risk-transferring / risk-evaluation / claims-management	Recovery-funding / Rapid restocking / Stability of fishery-dependent-communities / Ability to maintain supply-chains	Inadequate social-protection / insufficient-fundings	Parametric	immediate livelihood-resilience	Conceptual / applied	CR&AT / Marine SE&RT	Empirical-evidence
030	(Huang, et al., 2025)	Climate-risk-analysis	Global	Natural-perils	risk-transfer-mechanism	Underwriting-risk-analysis / Government-frameworks	Reduced-infrastructure / GDP-declines / Financial-stability	Low-adaptive-capacity / weak-governance	Resilience investment	Financial-sock-reduction / resilience-support	Comprehensive-multidisciplinary	CRT	Country-data
031	(Jain, et al., 2026)	Microinsurance-penetration	Global	Natural-perils	Microinsurance / IBI	risk-transfer / pricing	Reduced financial-shocks / Reduced debt-accumulation	poverty / climate-sensitive-livelihood / limited fiscal-access	microinsurance	Liquidity-provision / livelihood-resilience	SLR	MIT / CR&VT ³⁴	Dependency on secondary-data
032	(Ji, et al., 2025)	Spatiotemporal-dynamics and agricultural-impacts	China	Natural-perils	risk-transfer-mechanism	Underwriting-risk-analysis	Crop failure due to NP / Increased production-costs / Decline in food-security	Livelihood-diversification / poverty	Adequate-support	Financial-recovery tool	SLR	CR&VT / AgriET ³⁵	Rural-data
033	(Joshi, et al., 2025)	loss and damage due to climate-change	India	Natural-perils	risk-transfer-mechanism	Underwriting and claims-payout	Household-debts and reducing asset-losses	Climate-sensitive-livelihood	Government-support	Financial-recovery-protection	SLR	(L&D)T ³⁶ / SEST / DRR	Empirical-data
034	(Kamal, et al., 2026)	Financial-Literacy-Interventions	Pakistan	Natural-perils	risk-transfer-mechanism / microinsurance	Awareness-gaps in insurance / Pricing	Saving-behaviour / Reduced-vulnerability	Water-scarcity / soil-degradation / crop-yield volatility	Financial-literacy improves	Financial-recovery	SLR	FIT / RTT	Fragile-regional-data
035	(Kamble, et al., 2026)	Financial-resilience	Global	Natural-perils	Risk-transfer / Parametric / IBI	NPD / PPP	Increasing financial-buffer / Increased financial-literacy	Gender / Ecosystem-fragility / Price-shocks	Saving-buffer improves	Reducing-vulnerability	SLR	FIT / RTT	Fragile-regional-data
036	(Kelso, et al., 2026)	Nature-based-insurance	Global	Natural-perils	NBI / Parametric / risk-transfer	NPD / PPP / Regulations	Protection of tourism / Preservation of fisheries & aquaculture	Weak flood-defend-system / Wetland-shrinkage	Parametric-payouts	Supports long-term adaption	SLR	NbST ³⁷ / RTT / DRR	Evidence in NBI-developments
037	(Khalfallah, et al., 2026)	Climate-risk-management	Europe	Natural-perils	Risk-transfer / Parametric / ILS	Reinsurance / NPD / Risk-assessment	System-level outcome / Reinsurance-support	Transition-risk exposure	Reinsurance & parametric-payout	Liquidity-protection	SLR	CR&VT / SFT	data in long-term institutional-adaptation
038	(Khayat, 2025)	Climate-resilience in SIDS	Caribbean / Pacific / Indian	CST	Risk-transfer / Pooling	Risk-assessment	Reducing fiscal-shocks	Ecosystem-fragility / Water-scarcity / Coral-reef-degradation	Export-diversification improves speed	Supportive-resilience	Narrative	CR&VT / SEDT / SE&RT	Data on SIDS
039	(Kita, 2025)	Disaster-Insurance	Malawi	Natural-perils	IBI / Microinsurance / Risk-transfer	Underwriting / NPD	Enhance resilience and stability	Disease-outbreaks / Crop-yield-volatility / Livestock-losses	IBI / Microinsurance-payouts	Major-resilience / Institutional-delivery	Quali + SLR	CR&VT / FRT / RTT	data on rural-Malawi
040	(Klapper, 2025)	Resilient to Extreme Weather Events	Global	Natural-perils	IBI / Microinsurance / Risk-transfer	Underwriting / NPD	Increased financial-literacy / risk-behaviour	Water-scarcity / Soil-degradation / Ecosystem-fragility	Saving buffer improves	Supports livelihood	Narrative	FRT ³⁸ / RTT / DFT ³⁹	Fragile-regional-data
041	(Lavell, 2025)	Challengers in DRR	Global	Natural-perils	Risk-transfer / Risk-pooling	Underwriting	DRR-investments	Water-scarcity / Soil-degradation / Ecosystem-fragility	Improves strong DRR-investments	Support resilience	Conceptual	DRR / RTT	Heavy depend on expert opinion
042	(Lazarova & Kehayova, 2026)	Managing Zoonotic-Risk	Global	Extreme-weather	IBI / PPP / risk-transfer	Underwriting / NPD / Actuarial	Claims-management and settlement speed	Limited integration with insurance	Access to insurance-payouts improves	Supports livelihood	Narrative	RTT / FRT / DRR	Data low-income-regions
043	(Libert-Amico & Kolofoon, 2025)	Agrifood-systems	Global	Natural-perils	Risk-transfer	Underwriting	Strengthening supply-chain / Social-protection programme	Water-scarcity / Soil-degradation / Ecosystem-fragility	Resilient improves recovery	Support resilience	Narrative	FSRT ⁴⁰ / SEST	Variability in food-security- indicators / evidence

³³ IMT = Insurance market theory

³⁴ CR&VT = Climate risk and vulnerability theory

³⁵ AgrET = Agriculture Economic theory

³⁶ (L&D)T = Loss & damage theory

³⁷ NbST = Nature-based Solution Theory

³⁸ FRT = Financial resilience theory

³⁹ DFT = Digital Finance theory

⁴⁰ FSRT = Food-system resilience theory

044	(Luo, 2025)	Weather-Index-Insurance Scheme	India	Natural-perils	Risk-transfer / WII	Distribution-channels / NPD / Risk-assessment	Faster recovery on index-based-payout	Disease-outbreaks / Crop-yield volatility / Livestock losses	Accelerates Index-based payouts	Supports livelihood	Mix-methods	AgrRT / RTT	Heavy depend on pilot-project data
045	(Malifete, et al., 2026)	Climate-Resilient Smart- Cities	Global	CST	Risk-transfer / Green-insurance / Parametric	NPD / Digital-platforms	Sustainable-insurance supports climate- resilient	Limited green-infrastructure	Sustainable-insurance improves	Supports infrastructure-recovery	Bibliometric	SIT ⁴¹ / CR&VT	Heavy dependant on index-journals
046	(Marangwanda, 2025)	Reinsurance	Africa	Natural-perils	Reinsurance / ILS	Reinsurance / NPD	Reinsurance stabilises the market	Volatile-claim-risk exposure	Reinsurance speed out recovery	Reinsurance is a major resilient fact	Bibliometric	RTT / FRT	evidence of African insurers
047	(Meral & Cavga, 2026)	ESG-indicators	Global	Natural-perils	Parametric / PPP / Risk-transfer	ESG-integration / NPD	Revisiting pricing-strategy	Informal-settlement system	ESG penetrated system speeds up	Supports infrastructure-recovery	Bibliometric	ESG&ST / FRT / DRR	Inconsistence data about ESG
048	(Mishra, et al., 2026)	Physical-climate risk	USA	Natural-perils	Risk-transfer / Reinsurance / Parametric	Reinsurance / NPD / Risk-assessment	System-level / Resilience / Creditworthiness	Degraded ecosystem / Poor-infrastructure	Access to insurance and reinsurance speed up	Support resilience	Mix-methods	ESG&ST / FRT / RTT	long-term municipal-data
049	(Mitra, et al., 2025);	Climate-changes	Global	Natural-perils	Risk-transfer	Strategic-planning	System-level	Weak financial sector	Strong fiscal-buffer increases speed	Support resilience	Comprehensive	MacRT ⁴² / FRT / RTT	data in climate-impacts
050	(Mohamed, et al., 2026)	Pastoral-communities & drought	Global	Drought	Risk-transfer / IBI	NPD	System-level / Mechanism-level	High-dependency on livestock / Forage & Pasture-degradation	Livestock insurance speed up	Effective drought-management-system	Scoping	PLRT ⁴³	Under-representation of women pastoralists
051	(Mohan, 2026)	Debt-burden to climate-burden	Global	Natural-perils	Risk-transferring / Risk-pooling	System-integration / NPD / Risk-assesment	System-level / Long-term macroeconomic	Poverty / Ecosystem / infrastructure	Strong fiscal-buffers	Support resilience	Historical & Integrative data	MacRT / SDST ⁴⁴	Variability in modelling-assumptions
052	(Mohan & Strobl, 2025)	Hurricanes in SIDS	Caribbean	Hurricane	Regional risk-pooling - CCRIF SPC / Parametric	PPP / NPD / Strategic-finance management	System-level / Operational-level	Dependency on tourism & agriculture / Coral-degradation	Strong fiscal-buffers	Support resilience	Comprehensive	MacRT / SDST / RTT / DRR	long-term macroeconomic-data
053	(Monasterolo, et al., 2025)	Climate-insurance protection gap	Global	Natural-perils	Risk-transfer / ILS / ESG	NPD	ESG-aligned insurance improves resilience / Better risk-pricing reduces long-term losses	Degraded ecosystem / Poor-infrastructure	ESG-penetrated-system	Support resilience	SLR	CR&VT / FRT / IMT / RTT	validation in ESG impacts
054	(Mondal, et al., 2026)	Integrating climate with external factors	Global	Natural-perils	Risk-transfer / Parametric	NPD / PPP / Risk-assessment	Technology-pathways / Governance-reform / Climate-financing	Yield-volatility / Disease-outbreaks / Loss of biodiversity	Climate-financing improves	Support resilience	Comprehensive	CFT / TAM	evidence in low-income
055	(Muriqi, 2025)	Inland-flooding	USA	Flooding	RBP / Risk-transfer	NPD / Risk-assessment	Risk-management	Unequal-access for insurance	Updated flood risk-maps and access to for flood insurance	Support fiscal-stability	Comprehensive	RMT / RTT	data in flood-markets
056	(Montoya Alvis, et al., 2025)	Risk-governance	Global	Wildfire	Risk-transfer	Risk-governance	Staring in emergency-response system	Infrastructure	Increases strong risk-governance	Support resilience	Comprehensive	RGT / Land-use planning theory	fire-management knowledge
057	(Nanduri, et al., 2025)	Climate-resilience	Global	Natural-perils	Risk-transfer / PPP / Parametric	NPD / Governance-reform	Sustainable-finance / Strengthening fiscal-shocks	Yield-volatility / Poor-irrigation systems	sustainable-financing	Support resilience	Comprehensive	SFT / ICT / RTT	evidence in governance-systems
058	(Narijo, et al., 2026)	Climate-Resilience-Model	Pakistan	Natural-perils	Risk-transfer / Microinsurance	Underwiring / NPD	System-level–CSA / Managing production-cost	Yield-volatility / Disease-outbreaks / Loss of biodiversity	CSA increases speed	Supports agriculture-recovery	Mix-methods	CR&RT ⁴⁵ / FIT	data remote-communities
059	(Ncube, et al., 2025)	Social-protection in climigration	Global	Natural-perils	Risk-transfer	Underwiring	Social-protection reduce vulnerability	Poverty / Limited livelihood-diversification	Social-protection system accelerates speed	Support resilience	SLR	Climate-migration theory	data in youth climigration
060	(Nguyen, et al., 2025)	Agriculture Index-based Insurance	Global	Natural-perils	IBI (Climate) / Risk-transfer	NPD / Claims-management	System-level in index-base and satellite-based triggers	Yield-volatility / Disease-outbreaks / Loss of biodiversity	Accurate satellite-based insurance speedup	Supports agriculture-recovery	SLR	IndIT ⁴⁶	variability in satellite-data resolution
061	(Nilakurnia & Koestoer, 2025)	Social-protection for Natural-disaster	Indonesia	Natural-perils	Risk-transfer / Microinsurance	NPD / Digital-platforms	ASP reduces long-term vulnerability	Weak-social-protection system / Coastal-hazards / limited livelihood-protection	ASP coverage improves recovery	Support resilience	SLR	ASPT ⁴⁷	evidence in remote rural-region
062	(Nor, 2025)	Climate-financing	Somalia	Drought	Risk-transfer / Microinsurance	NPD / Digitalisation	System-level solutions for climate-financing gaps	Yield volatility / Livestock-disease outbreaks / Weak-irrigation-system	Climate-financing access increase recovery	Support resilience	SLR-PRISMA	CFT / RTT / RD&IT ⁴⁸	data in rural-Somalia
063	(Nuntasuwan, et al., 2026)	Risk-management	Global	Natural-perils	IBI / Parametric / Microinsurance / ILS	NPD merging SPI-SPEI-PDSI	Improves payouts / Accurate indices minimise long-term losses	Crop-failure / indices reduce long-term-liability	CIB-insurance	Supports agriculture and infrastructure-recovery	SLR-PRISMA	RSGDT ⁴⁹ / IndIT	Difficult isolating climate-impacts

⁴¹ SIT = Sustainable Insurance theory

⁴² MacRT = Macroeconomic risk theory

⁴³ PLRT = Pastoral-livelihood resilience theory

⁴⁴ SDST = Sovereign-debt-sustainability theory

⁴⁵ CR&RT / CRT = Climate-risk & Resilience theory

⁴⁶ IndIT = Index-Insurance theory

⁴⁷ ASPT = Adaptive social protection theory

⁴⁸ RD&IT = Rural-development and inequality theory

⁴⁹ RSGDT = Remote-sensing and geospatial-data theory

064	(Nurullah, et al., 2026)	MCPD	Global	Natural-perils	Risk-transfer / Microinsurance	NPD	System-level changes for MCPD	Youth-unemployment / Weak-rural-labour market	Resilient-infrastructure speed up recovery	Support resilience	SLR-PRISMA	MDIPT ⁵⁰ / DRR / RTT	evidence in low-income-regions
065	(Nyathi & Ndlovu, 2026)	Climate-change-resilience	South-Africa	Natural-perils	Risk-transfer	NPD / System-integration	Social-protection-systems	Flood-prone & drought-exposed regions / Poor-climate-risk-governance	Livelihood-support programmes increases speed	Help prevents poverty-traps	Scoping	SPT / DRR / RTT	Under-presentation of gender and youth
066	(Ogunmakinde & Egbelakin, 2025)	Disaster-resilience	Global	Natural-perils	Risk-transfer / IBI / PPP / ILS / Reinsurance	Secondary-hazard-risk-transfer	PPP insurance increases economic stability	Weak-PPP-governance	PPP-based-risk-transfer schemes	Encourages-climate-adaptive investments	SLR	PPP-governance-theory / RTT	PPP performance
067	(Oh-Seng, et al., 2025)	SIDS	Caribbean / Pacific / Indian Reefs	Ocean-warming	Risk-transfer	Parametric-underwriting / NPD	Strong DRR institutions reduce long-term economic impacts	Socio-economic-vulnerability / Fragile-utilities	Strong-governance accelerates-recovery	Supports infrastructure-recovery	SLR-PRISMA	CGT / CR&RT	data in SIDS
068	(Oliveira & Martinez-Perez, 2026)	Climate-hazards	Global	Heatwaves	Risk-transfer	Regional-cooperation / Governance	DRR institutions reduce economic-impacts	Heat-stress exposure / Weak building codes	Investment in resilient-infrastructure	Reduces fiscal-pressure on government	Scoping	CGT / ICT / RTT	data in low-income-regions
069	(Omokpariola, et al., 2025)	Climate-changes	Sub-Saharan-Africa	Droughts	Risk-transfer	NPD / IBDI / Microinsurance	Climate-smart-agriculture	Youth-unemployment / Weak-rural-labour market	Climate-smart-agriculture	Helps prevent food-crisis	Scoping	FCT / RTT / CR&RT	Difficult isolating climate-impacts
070	(Onel, et al., 2026)	Flood-resilience-strategies	Global	Natural-perils	Risk-transfer	Parametric-underwriting / NPD	Elderly & disabled population / Income-inequality	Weak-infrastructure / Air-quality deterioration	Integrated DRR system	Reduces fiscal-pressure on government	Bibliometric	Urban-resilience theory / CR&RT	Variability in the term resilience- definition
071	(Orimogunje & Aniramu, 2025)	Flood-resilience-strategies	Nigeria	Flood	Risk-transfer	Parametric-underwriting	Transport-system disruption	Extreme-rainfall / Sea-level increase	DRR-adaption plans	Provide-liquidity after flood-shock	SLR-PRISMA	Urban-resilience theory / CR&RT	Variability in the term resilience- definition
072	(Patil, et al., 2025)	Transforming-risk	India	Natural-perils	Parametric / IBI / Hybrid-models (NPD) / PPP	NPD-index-based - products	Stabilities in shrimp-aquaculture	Temperature-stress / Climate-smart technology	Rapid-parametric-payouts	Supports small-scale farmers	SLR-PRISMA	Aquaculture-resilience theory / Risk-transfer and insurance theory	Lack of information in smallholder-farmers
073	(Pleterski, 2025)	Parametric-insurance	Slovenia-Croatia	Natural-perils	Risk-transfer / Parametric / IBI / PPP	Risk-pooling / NPD	Reduce fiscal-pressure	Weak-drainage-infrastructure	Rapid-parametric payouts	Major-role in resilience	SLR	RTT / CR&RT	information in Croatian-context
074	(Pramudya, et al., 2026)	Insurance in constructions	Global	Natural-perils	Risk-transfer	NPD	Reduces systematic-risk	Climate-hazards effect on constructions	Strong project-risk-management	Supports major-construction-projects	SLR-PRISMA	RTT / CR&VT	Variability-climate-risk-reporting
075	(Putri, et al., 2026)	Insurance-local-aquaculture-systems	Global	Natural-perils	Risk-transfer / Microinsurance / PPP	NPD / Risk-evaluation	System-level outcome in aquaculture-markets	Water-quality-fluctuation	Rapid-parametric payouts	Supports livelihood-recovery	SLR-PRISMA	RTT	Variability-climate-risk-reporting
076	(Remeena & Krishnan, 2026)	Catastrophic-insurance	Global	CST	Risk-transfer / IBI /Reinsurance / PPP	Risk-evaluation / NPD / Awareness-creation	Improving catastrophic-resilience	Poor-catastrophic-data / poor-agency-coordination	Strong regulatory-governance	Reduce-fiscal-pressure on government	Bibliometric	RTT / FRT / DRR	Variability in catastrophic-risk-reporting
077	(Roper, et al., 2025)	Climate-change & insurance	Global	Natural-perils	Critical-risk-transfer	Risk-evaluation / Hybrid-insurance-models	Resilience-based-underwriting	Insufficient-regulation / Extreme-weather	Rapid-parametric payouts	Encourages climate-adaptive-insurance	SLR	RTT / MRT	Variability-climate-risk-reporting
078	(Roy, 2025)	Non-Life-Insurance-Penetration	India	Cyclone	Risk-transfer / Microinsurance	NPD / Risk-evaluation	Reduces systematic-risk	High-exposure for climate-shocks	Climate-smart-agriculture	Encourages climate-adaptive-insurance	SLR	RTT / MRT	Variability in insurance-penetration-reporting
079	(Saefullah, et al., 2025)	RPM for Disaster-Insurance	Global	Natural-perils	Risk-transfer / RBC / Reinsurance	NPD / Risk-evaluation	Claim-payment-surges / Solvency-frameworks	Regulatory-gaps / poor regulatory-management-systems	Effective reinsurance-systems	Enhancing-resilience	SLR	IST ⁵¹ / DRR / RTT	empirical-case-studies
080	(Sanduni Ashvini, et al., 2025)	Flood-risk management	Sri Lanka	Flood	Risk-transfer / Parametric / PPP / RBC	NPD / Risk-based-premiums	Improving flood-exposed markets / Supporting business-interruptions	Inadequate flood-protection-infrastructure / Low insurance-literacy	Flood-risk-modelling	Supports household & business-recovery	SLR-PRISMA	RTT	empirical-evidence in Sri-Lanka
081	(Shami, et al., 2026)	Risk-management in Mage-projects	Pakistan	Natural-perils	Risk-transfer / Reinsurance	Risk-transferring / NPD in CAR / Reinsurance	Merging with strong reinsurers	Weak project-risk-governance / Seismic-exposure	Rapid claim-settlement-processes	Mitigating financial-shocks	SLR	RTT / CR&VT	Variability in insurance-reporting-standards
082	(Sinkula, 2026)	DRF & CEM	Sub-Saharan	Natural-perils	Risk-transfer / Parametric	Risk-evaluation / NPD	Energy-price volatility	Insufficient energy-sector planning	Strong DRF	Complements climate-finance-mechanisms	SLR-PRISMA	DRFT / ERT ⁵²	Variability-climate-risk-reporting
083	(Suciati, 2025)	Mitigating-climate-risk	Global	Natural-perils	Risk-transfer / Parametric	Risk-evaluation / NPD	Improving micro-financial-governance	Debt-sustainability trajectories / Ecosystem-degradation	insurance and risk-transfer-tools	Stabilises-financial-markets	Bibliometric	FST / RTT	Low empirical-evidence from low-income-countries
084	(Tandukar, et al., 2025)	Mitigating-climate-changes	Global	Natural-perils	Risk-transfer-architecture / Reinsurance / Parametric	Risk-evaluation / NPD	Improves macro-financial-resilience	Climate-sensitive-livelihood	insurance and risk-transfer-tools	Stabilises-financial-markets	SLR-PRISMA	CFT / RTT / CR&RT	Variability-climate-risk-reporting
085	(Traor� & Tetka, 2025)	Health-insurance in Climate-change	Sub-Saharan	Natural-perils	Risk-pooling	CBHI-Schemes	Insurance + social protection programs	Low-community-adaptive-capacity	Universal-health-insurance-coverage	Complements social-protection-systems	Narrative	Public-health-systems theory	Narrative isn't scientific

⁵⁰ MDIPT= Multidimensional-poverty theory

⁵¹ IST = Insurance-solvency theory

⁵² ERT = Energy-resilience theory

086	(Wang, et al., 2025)	Climate-resilience	Global	Natural-perils	Risk-transfer / Parametric	Climate-risk-analytics / NPD	Systematic-financial-risk / ERM-practices	Insufficient-resilience-investment	Climate-resilient-infrastructure	Complements ERM-ESG-frameworks	SLR	ERMT ⁵³ / RTT / CRT	SME-evidence
087	(Wu, et al., 2026)	Financial-resilience	Global	Natural-perils	Risk-transfer / IBI / Reinsurance	Risk-evaluation / NDP / Digitalisation	Improved community-resilience	Limited access to formal-financial-services	Digital-financial-tools	Provides-liquidity	SLR	FRT	Heavy-reliance on secondary-data
088	(Zhao, et al., 2025)	Weather & Climate-services	China	Natural-perils	Risk-transfer / Parametric	Risk-evaluation / Risk-modelling	Climate-risk-analysis	Weather-index-payout	Extreme-weather	Supports agriculture & energy sectors	Conceptual	FMT ⁵⁴	Gaps in data
089	(Zhao, et al., 2026)	IBI	Global	Natural-perils	Risk-transfer / Parametric	Risk-evaluation / Risk-modelling	Parametric-settlements	Extreme-weather-hotspots	Rapid parametric-payouts	Supports agriculture-stability	SLR	IndIT	Variability in index-accuracy
090	(Zhou, et al., 2026)	Index-based Flood-Insurance	Global	Flood	Risk-transfer / Parametric	Risk-evaluation / Parametric-claims-settlement	Index-based settlements increase trust	Insufficient-insurance-literacy	Rapid parametric-payouts	Supports flood-exposed-community	SLR	IndIT	Variability in index-accuracy
091	(Zhao, et al., 2025)	Power-system-catastrophe-risk-management	Global	Natural-perils	Risk-transfer / Parametric / Reinsurance	Risk-pooling / Evaluation	Actuarial improve catastrophic-pricing-models	Rising insurance-premiums / Reinsurance-volatility	Grid-hardening-investments	Support for rapid-grid-restoration	Conceptual	Engineering-risk theory	Data-gap in grid-restoration
092	(Wolff, 2025)	Resilience in disaster	Global	Hurricane	Risk-transfer	Risk-management-strategies	Disaster-aid-resilience-framework	Institutional-vulnerability	Institutional-support-accelerates-settlements	Resilient-framework	Mixed-methods	Not-specified	Conceptual rather empirical
093	(Vahedi, et al., 2025)	Climate-change	Global	Wildfire	Risk-transfer	Risk-management-strategies / Reinsurance	Disaster-aid-resilience-framework	Grid-triggered wildfire-recovery	Redundancy in grid-network	Support for rapid-grid-restoration	SLR	Infrastructure-risk theory / DRR / RTT	Data-gap in grid-restoration
094	(Teku & Tariku, 2026)	DRR	Sub-Saharan	Natural-perils	Risk-financing / IBI	Ris-evaluation / modelling	Insurance / DRR-strategies	Underfunded hydromet-systems	Integrated-DRR-Governance	Provides-fiscal-security	SLR-PRISMA	DRR / RTT	Equity-gaps
095	(Teku & Derbib, 2025)	Livestock-hazards	Ethiopia	Flood / Earthquake	Risk-transfer	NPD / Risk-evaluation	Insurance / DRR-strategies	Insufficient-policy-framework / Climate-sensitive-livestock	Rapid with EWS	Financial-protection	SLR-PRISMA	DRR / RTT	Limited data in geological-hazards
096	(Tariro, et al., 2025)	IIB	Global	Natural-perils	Risk-transfer / Parametric	NPD / Parametric-payouts	IIB-increases-productivity	Agri-related-perils	Rapid with IIB	Supports-livelihood-recovery	SLR-PRISMA	RTT	Variability in IBI
097	(Sukono, et al., 2026)	Community-Based-DRM	Global	Natural-perils	Parametric	Community-based DRR	Insufficient-community-capacity	Climate-sensitive-livelihood	Rapid with DRR	Complements Community-based-DRR	SLR	DRMT	Variability in modelling-accuracy
098	(Sparkes, et al., 2026)	Complex-Climate-Risks	Global	Natural-Perils	Risk-transfer	NPD / Risk-evaluation	Adaption-pathways	Compound-hazards	Rapid with climate-risk-governance	Complements adaption-finance	SLR-PRISMA	Adaptation-pathways theory	Under-representation of local-level-adaptation
099	(Silva, et al., 2025)	Catastrophise & Politics	Global	Natural-Perils	Risk-transfer	NPD / Risk-valuation	Political-instability worsens disaster-impacts	Flood-drought prone regions	Integrated-climate-risk-planning	Complements-public-sector-strategies	SLR-PRISMA	Political-economy theory / DRR	Lack of empirical-evidence-fragile-states
100	(Seghini, 2026)	Macroeconomics of Climate-change	Global	Natural-Perils	Risk-transfer	NPD / Risk-mitigation	Reducing systemic-macroeconomic-instability	Insufficient DRR-governance	Supports fiscal-shock	Complements-climate-finance	SLR-PRISMA	MacRT	Lack of empirical-data

⁵³ ERMT = Enterprise Risk management theory

⁵⁴ FMT = Financial-meteorology theory

PART 3

The Role of Insurance Mechanisms in Managing and Mitigating Financial Losses From Climate-Related Catastrophes: A Systematic Review

1. Introduction

In the modern insurance context, climate-related catastrophes (CRC) including all kind of natural-perils⁵⁵ have become a significant factor of risk-taking in terms of socio-economic losses. These destructions are effecting every livelihood of human and live-stock demolishing homes, infrastructure, businesses, agriculture and every aspect of economy, and cause sever negative impacts in financial stability. The bibliography table in PART-2 demonstrates the evidence in scholars who explicitly discussed about the CRC and its adverse effects on financial stability, and to which extend the insurance plays a role to managing and mitigating the incurred losses (Albrecher & Loisel, 2026), (Awah & Ogundeji, 2026), (Bani, 2026), (Belmahi & Jabari, 2025).

Insurance, as a risk-management tool, is based on several insurance mechanisms in terms of identifying, evaluating (Sinkula, 2026), and strategising risk factors and solutions. These mechanisms are fundamentally based on risk-pooling (Barrage, 2025; Khayat, 2025) and risk-transferring (Beaussier et al., 2026; Hobday et al., 2025) concepts, advancing risk evaluation through mechanisms such as parametric insurance, RBP, reinsurance, ILS, and microinsurance. A stand-alone activated insurance policy is unable to provide the expected financial recovery for any catastrophic event. The role of insurance varies according to the exposure, cause, frequency, and the level or severity of the damage or loss. The purpose of this SLR is to examine the role of insurance in managing and mitigating financial losses occurring due to CRC in a global context and the insurance mechanisms widely used to mitigate fiscal losses to the insurer or the country's economy.

2. Research Objectives

- I. To explore the different types and dimensions of insurance-mechanisms mostly used in managing financial losses caused by CRC.
- II. To explore the role of insurance in managing and mitigating the financial losses rising due to CRC.
- III. To explore the economic-vulnerability indicators impact on the time of financial recovery due to CRC.

⁵⁵ Natural-perils including, flood, droughts, cyclones, wildfires, heatwaves, extreme-rainfall, storms, tempest, hurricanes

3. Literature-review

The literature review of the research topic explicitly follows the process of SLR, where the flow of the review has been briefly discussed in PART-1. The area of the study is highly discussed in the global insurance sector, which has published a number of scholarly articles that have massively contributed to the industry and academia as well. Therefore, in this section, the research is emphasizing the theoretical foundation of related research areas and providing a detailed explanation about the key mechanisms illustrated in PART-2.

3.1 Theoretical Foundation

3.1.1 Risk-transfer Theory (RTT)

This key theory in this study plays a significant role in the insurance concept, which is massively practiced in most of the insurance mechanisms. As explicitly described by Belmahi and Jabari (2025), Codal (2026), Giovanni et al. (2025), Malifete et al. (2026), Marangwanda (2025), Patil et al. (2025), Roper et al. (2025), Sinkula (2026), and Tandukar et al. (2025) in their scholarly articles, a part of the risk exposure of any peril is transferred to another party such as insurers or reinsurers for a meticulously calculated premium. In the scope of CRC, where the nature of loss is generally high (Aldridge & Bell, 2025; Remeena & Krishnan, 2026; Tandukar et al., 2025), RTT plays a significant role in transferring the risk to another party through a contractual agreement. The concept of risk-pooling (Bani, 2026) operates by contributing multiple policyholders with similar risk exposure to reimburse similar losses within the contractual agreement. Highly exposed risks such as CRC are transferred via reinsurance, ILS, and regional risk pooling. The bibliographic data collected in the table in PART-2 supports the principle of risk-transferring applied in the scope of CRC (Patil et al., 2025), which provides massive financial resilience (Giovanni et al., 2025) by transferring the risk via parametric (IBI), reinsurance, and ILS from governments and vulnerable entities (Marangwanda, 2025). RTT has extended its intensity to build risk-evaluating frameworks for adverse selection (Albrecher & Loisel, 2026), catastrophic-risk modelling (CAT) (Aldridge & Bell, 2025; Ali, 2026), moral hazards (Albrecher & Loisel, 2026), and premium pricing. In terms of CRC, the inconsistency of climate hazard frequency and severity may challenge historical data, making the available information more unreliable. Although CAT-risk modelling is important for underwriters and actuaries to evaluate and scrutinize the risk and enforce the most suitable coverage (Zhao et al., 2026). Reinsurance practice is also highly based on the principle of RTT, where insurers transfer massive exposure of risk in large-scale projects at global level to capital markets to secure solvency capacity and claim settlements. Thus, RTT directly supports RO1 in exploring different types of insurance mechanisms and dimensions to manage financial losses arising due to CRC.

3.1.2 Climate-Risk & Resilience Theory (CR&RT)

CR&RT or CRT resonates with the recovery from post-disastrous financial losses (Ayadi & Forouheshfar, 2025; Ayompe & Epie, 2025; Ho & Lyke, 2026; Narijo et al., 2026) and how to resile from future hazards in every aspect of social, economic, and environmental systems (Bill-Weilandt et al., 2026). This theory contains two major preliminary elements that cover climate-related risks and resilience over the loss (Bill-Weilandt et al., 2026). The climate-risk element focuses on vulnerability (Hobday et al., 2025), exposure, transferability, and the fragility of the hazard (Gopal et al., 2026), whereas the resilience element focuses on the speed of recovery (Huang et al., 2025) in socio-ecological systems (Hobday et al., 2025), adaptive capacities, and bounce-back speed. Due to the unpredictable nature, frequency, and severity of CRC damages, CR&RT provides knowledge on how to evaluate vulnerability, transfer the risk, assess adaptability (Han et al., 2026) for future hazards, and determine which mechanism is best suited for the respective CRC (Giovanni et al., 2025). According to the data gathered in PART-2, authors have highlighted CR&RT as a resilience accelerator (Bill-Weilandt et al., 2026; Giovanni et al., 2025; Gopal et al., 2026; Hobday et al., 2025; Khalfallah et al., 2026; Monasterolo et al., 2025; Orimoogunje & Aniramu, 2025). Dividing into the two elements of CR&RT, the climate-risk fragment focuses on indicators such as frequency and severity of hazards, poverty levels, infrastructure fragility, ecosystem degradation, fiscal exposure, and insurance penetration. Whereas the resilience fragment focuses on indicators such as claims-settlement speed, recovery time, restoration processes, and adaptive governance. CR&RT theory explicitly discusses the systematic-risks caused by various natural perils and CRC, and the commonly used insurance mechanisms grounded in CR&RT such as risk transfer (Khayat, 2025), reinsurance, PPP (Mondal et al., 2026; Nor, 2025), parametric (Barrage, 2025; Codal, 2026; Han et al., 2026), digital risk modelling (Atlasi et al., 2025), and climate-smart agriculture (Omokpariola et al., 2025). It also highlights long-term adaptive strategies in resilience such as regional pooling (Mohan & Strobl, 2025), risk financing (Khayat, 2025), NbS⁵⁶ (Kelso, et al., 2026), sustainable-insurance (green insurance⁵⁷) (Malifete, et al., 2026) and climate-financing (Nor, 2025).

3.2 **Defining Key Insurance-mechanisms**

In order to comprehend the research objectives, in this section the researcher briefly explains the key insurance-mechanisms⁵⁸ widely practiced in the global context to evaluate, manage and mitigate the CRC.

3.2.1 Parametric and IBI

In terms of CRC, parametric insurance and IBI are commonly categorized under the same group of insurance mechanisms. Both mechanisms pay claims (Albrecher & Loisel, 2026; Gopal et al., 2026) under measurable

⁵⁶ NbS is specified insurance model designed to cater climate-adaption (Lameh, 2026).

⁵⁷ Specific insurance products designed to promote environmental sustainability specially on renewable-energy projects and low-emission vehicles.

⁵⁸ Insurance-mechanism is a method of obliging the legal contract between the insurer and the insured or the reinsurer and the cedent for an agreed premium in order to recover a loss agreed upon a predetermined peril (TATA-AIA, 2022)

pre-defined indices rather than a loss assessment after an event. Both mechanisms are widely used in agriculture (Ayompe & Epie, 2025), fisheries (Chuah et al., 2026), sovereign risk pools (Barrage, 2025), and disaster financing (Bani, 2026). Parametric insurance and IBI accelerate financial recovery as the payouts are modelled according to triggers. The difference is that parametric insurance has predefined triggers for the payment process, whereas IBI pays according to predetermined metrics (Albrecher & Loisel, 2026).

3.2.2 Risk-transfer mechanism

Risk-transfer mechanisms facilitate transferring the large-risk exposure of CRC to an insurer, reinsurers, or a capital market (Cimbru et al., 2025) through the concept of risk-pooling, and this is the most commonly used insurance mechanism by insurance practitioners. It provides post-disaster liquidity and supports speedy recovery (Codal, 2026) and the adoption of resilience. Another method of transferring risk is ILS⁵⁹ (Han, et al., 2026) as well as derivative and hedging⁶⁰.

3.2.3 Reinsurance (RI)

Reinsurance mainly transfers large-risk exposure from insurers or large projects directly with governments to global RI-markets providing solvency and reducing fiscal pressure on insurers or governments (Mishra, et al., 2026). RI practice resonates the financial stability and absorbing the financial-shock caused by a major CRC event (Barrage, 2025).

3.2.4 Microinsurance (MI)

MI specifically caters to low-income households with affordable premiums and simplified coverages. Mostly, MI products are designed according to the specific risk exposure of the vulnerable population. MI largely leverages community groups facing the same risks, such as crop insurance (Narijo et al., 2026; Klapper, 2025), health insurance, home and small-business interruption insurance, and livestock insurance (Kita, 2025). This mechanism helps communities experiencing poverty (Onel et al., 2026) by providing substantial financial support during a CRC event.

3.2.5 Public-private-partnerships (PPP)

PPP is an emerging insurance-mechanism with a critical infrastructure to facilitate mostly the CRC events from large financial shocks (Onel, et al., 2026). It is rather a risk-mitigation process by amalgamating large insurance companies with public sector institutions to form necessary policies and procedures on a long-term contract with risk-sharing concept. PPP is mainly aligned with sustainable-insurance (Kelso, et al., 2026) in such case aquaculture and agriculture are significant (Patil, et al., 2025).

⁵⁹ Insurance-lined securities (ILS) a special form of agreement used by reinsurers to transfer risks in large markets and CAT-bonds are significant among them.

⁶⁰ Allowing organizations to transfer their financial instruments such as interest-rates, or currency-risk to another counter party.

4. Methodology

4.1 SLR Approach

This study has approached SLR process to identify and analyses the reality of the research topic, due to its complexity with insurance-mechanisms involved in CRC events and highly-fragmented nature with multiple-disciplines such as; CRC, resilience, financial-recovering and risk-transferring etc., Further, the researcher has made a valiant effort to be unbiased and transparent in her review by using the SLR. The process of SLR method has been discussed in PART-1.

4.2 Journaling and Data-retrieval Process

The researcher has followed the guidance of PRISMA-2020 in order to maintain transparency and reproducibility of data. The process began by retrieving data from multiple sources using the key words: insurance mechanisms, climate-related catastrophes, financial losses, role of insurance, economic vulnerability. There were 4,460 records from Google Scholar and 178 records from Consensus identified on 15.08.2026, totalling 4,638 relevant to the research topic. After removing 220 duplicates, 4,418 were subject to screening. There were 2,534 articles removed for the period of publication, as the researcher only considered data for 2025–2026. The frequency and severity of CRC events and their unpredictable nature are rapidly changing the parametric indicators and indices, causing outdated data. Subsequently, 1,884 records were eligible for further screening. Due to the complex nature of the research topic, gathering data from the most-reviewed papers validated the theoretical lenses and the concepts of the latest and widely used insurance mechanisms. Accordingly, 898 articles were filtered and 986 were eligible for further screening. As an exclusion criterion, filtering 53 journals left 933 papers to provide unbiased, unrestricted information. 378 journals were removed due to non-compatibility with the insurance mechanisms and CRC events. The remaining 555 journals were screened for insufficient information not falling within the required research scope, where 143 journals were excluded. The remaining 412 journals were closely screened to remove irrelevant outcomes not supporting the research objective, where 312 records were excluded, and the most suitable 100 records were illustrated in the PART-2 bibliography table.

PRISMA 2020 FLOW DIAGRAM FOR SYSTEMATIC LITERATURE REVIEW

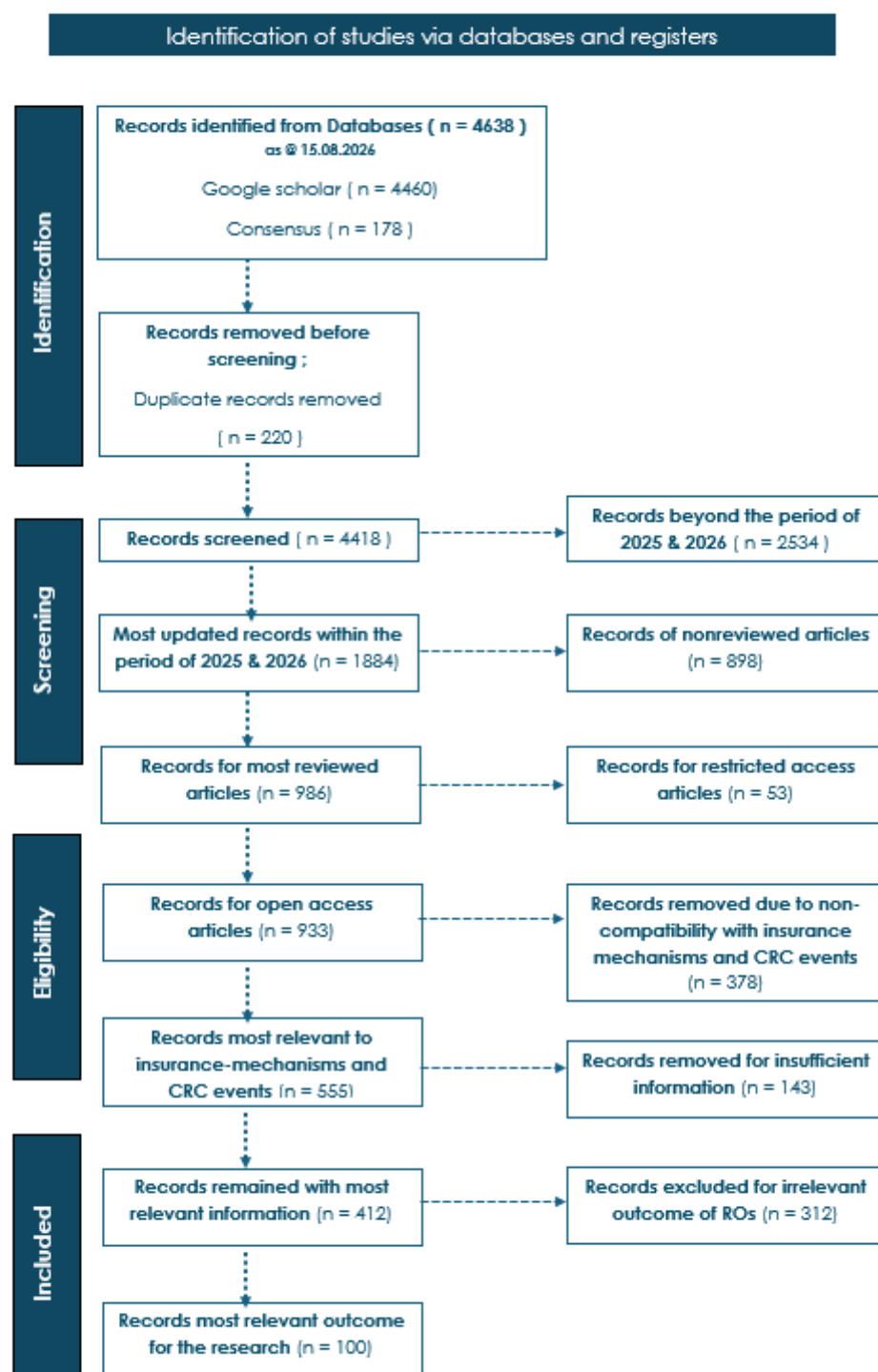


Figure 2. PRISMA-2020 Diagram flow related to the research topic

5. Discussion

5.4 Dimensions of insurance-mechanisms in mitigating and managing financial losses (RO1)

Even though conventional indemnification compensates any general-class business under the conventional claim-settlement process, large events such as CRC require comprehensive protection in order to mitigate and manage the financial losses encountered by insurers or the government. In the literature, it has been explicitly discussed that parametric/IBI, risk-transferring, reinsurance, microinsurance, ILS, and PPP are the most popular insurance mechanisms in the CRC recovery process. Further, these mechanisms function more practically via NPD by customizing insurance policies specifically for the nature of CRC. Accordingly, Mohan & Strobl (2025) discuss specific CRC risk in the Caribbean region through CCRIF, Luo (2025) refers to crop insurance in India, and Orimoogunje & Aniramu (2025) discuss flood risk in Nigeria. Further, the major contribution of these mechanisms supports risk-evolution and risk-management dimensions to mitigate future financial losses with appropriate resilience strategies.

5.5 The role of insurance in mitigating financial losses arising from CRC events (RO2)

Right through the study, the role of insurance has been highlighted as a financial recovery tool (Albrecher & Loisel, 2026), liquidity provider (Bani, 2026), financial-risk absorber (Aldridge & Bell, 2025), and major resilience tool (Ayompe & Epie, 2025) for future CRC exposure. The role of insurance is to compensate financially the respective households, businesses and governments in alignment with to the insurance-mechanisms discussed in the Section 5.1. Therefore, the insurance plays a significant role in accelerating the reconstruction and mitigating the economic-scarcity.

5.6 Economic-vulnerability indicators and facts impact on speedy-recovery (RO3)

The study has identified several economic-vulnerability factors that adversely impact the recovery of the financial losses by CRC. The general nature of the large severity of the CRC event the financial recovery depends on the economic factors of the respective context. In this study it has been identified that low-insurance-penetration⁶¹ (Apau & Sibindi, 2025), the unpredictable nature of the climate-hazards (Ali, 2026), infrastructure-fragility (Aldridge & Bell, 2025) including digitalization, poor-livelihood and poverty (Awah & Ogundeji, 2026), major regulatory-gaps (Albrecher & Loisel, 2026), over-dependency in certain industries as key economic vulnerability factors (Ayompe & Epie, 2025). In meantime, there are several factors that speed-up the financial-recovery process in terms of managing and mitigating financial losses such as; mainly the insurance-mechanisms discussed in the aforementioned sections, financial-literacy (Kamal, et al., 2026), investments in resilient-infrastructure (Oliveira & Martinez-Perez, 2026) and DRR governance⁶² (Lavell, 2025).

⁶¹ Insurance-penetration is the ratio of premium upon the GDP of the economy.

⁶² DRR governance is the institutional, mechanical, policies and legal-framework coordinate and managing disaster-risk management (UNDRR, 2026).

6. Limitations and Conclusion

Primarily, the heavy dependence on secondary empirical data creates gaps in existing empirical-studies to provide consistent, context-related, accurate information. In the findings, it has been found that extremely context specific scenarios which proves that CRC events and the resilience strategies ought to be customized and cannot be addressed in generalized frameworks. The outcome of the findings depends on the review approach as this study uses SLR and the interpretation of the same study will be different if it were a narrative-review or a scoping-review. According to the findings, it emphasizes that this scope of study requires consistency with the most updated indicators as the CRC have a rapidly changing nature.

This study has explored the central-role of insurance-mechanisms in managing and mitigating the financial-losses related to CRC events. This study has revealed that insurance-mechanisms accelerate the fiscal recovery by acting as a shock-absorber for the CRC losses by providing the necessary liquidity support and leading the economy towards necessary resiling way-forward. Further, the study has highlighted that parametric, IBI, reinsurance, microinsurance, ILS and PPP are the most popular and emerging insurance-mechanisms those function in different dimensions in CRC. In Section 5.3 it has revealed the most impactful economic-vulnerability indicators affecting the time of the recovery. These indicators differentiate their behavior according to the population, context and the degree of accessibility for the necessary risk-transfer mechanisms. In addition, the study has identified that the unpredictable nature of CRC in its frequency, and severity of the damage, climate-related risk evaluation and setting-up resilience tools has become more challenging. Finally the overall study demonstrates that how significant the role of insurance is in recovering the financial-losses caused by CRC event, not only as a mere insurance product but as a rebuilding and resilience-facilitating tool supports households, businesses and governments in large scale for sustainability from CRC.

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