

PARATUS SYSTEMIC RISK BOARD GAME

Version September 2025

A set of cards that can be used
to map cascading and
compounding hazardous events
and their impacts, systemic risk
and mitigation measures



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What is the game about?



The PARATUS Systemic Risk Board Game is based on the various methodologies developed during the project, i.e., impact, exposure and vulnerability analysis methods that enable systemic risk assessment across sectors.

The game helps players to discuss and analyse the cause-and-effect relationships, changing risk dynamics across the space and sectors to develop scenarios and risk mitigation options together.

Each card corresponds to an essential component: hazard, vulnerability, sector, impact, and various actions to reduce the multi-hazard risk.

The game allows us to discuss/select the best available action to reduce systemic risk based on a single or multi-hazards events.

Learning from the past and predicting today's future



The game starts by mapping the cause effect relationship with the help of impact chains. Impact Chains (ICs) are conceptual models to streamline the analysis of complex cause-effect relationships and to provide a structured framework for the comprehensive assessment of the related risks and of their components.

ICs describe through an intuitive and graphical description the complex chain of cascaded impacts induced by possibly compounded natural and anthropogenic hazards.

They can be built around current risks situation and extended through the identification of factors and elements related to a potential future situation.

Moreover, they can be adopted to describe past disaster events through their integration with disaster forensic analysis.

They are usually co-defined with domain experts in a participatory process and can be supported by desktop-analysis integrating knowledge from empirical evidence and scientific literature.

How to play?



Play the PARATUS Card game to

- Identify the hazards and their cascading hazards,
- Analyse the pre-disaster conditions / vulnerabilities (e.g.: tourist resorts in the coastal areas)
- Build a story with sectors and assets exposed to the disaster,
- Lay the impact cards for a desired timescale and assess the impact of the disaster on different assets and sectors,
- Brainstorm as a team with Action cards to enhance the area's resilience to such disasters and reducing their impact.
- You can also play different roles (such as policy maker, urban planner, rescue officer, insurance company, scientist, municipality, etc.) while playing the game, to gain a better understanding of how easy/difficult planning could be.

How to play?



You can use the card best in a workshop style, within groups of 4-5 persons.

Steps to take:

- First discuss a historical compound and cascading disaster event, and find some information on it if you are not familiar with it.
- Start with the hazard cards, and reconstruct how the hazards interacted;
- Fix the hazard cards with glue in the sequence that occurred for the selected events, and use a timeline on the white sheet of paper;
- Discuss for which sectors you would like to evaluate the impact, and also the cascading impacts from one sector to the other. Make the sectors in vertical boxes below the hazard cards.
- Discuss the direct and indirect impact within the selected sectors, and use the timeline to differentiate;
- Make cross-sectoral links showing cascading impacts.

Preparation



These cards can be used freely but reference should be made as follows:

- PARATUS Systemic Risk Card Game (F. Atun, P. Ghosh, C. van Westen & M. Kulakowska 2025) DOI: 10.5281/zenodo.17201554
- What is needed:
- These cards, printed out in colour, cut into individual cards, and ordered by type
- A large sheet of paper (e.g. 1 by 1.5 meters) put on a table
- Glue (stick or gums) to fix the card to the paper (if you later want to display it vertically)
- Markers (thicker ones for making arrows between component, and a think one for writing missing cards.

Print the file, cut the cards, and order them by type. Use a large white sheet of paper on a table, use glue to fix the card, and pens to draw connections between the cards, and for filling in missing cards.

What is next?



Once you have made an impact chain you can do one of the following:

- Discuss which of the impacts concerns damages and which losses, and mark that on the paper;
- Discuss which of the impacts can be quantified and which not;
- Discuss which of the impact can be predicted,

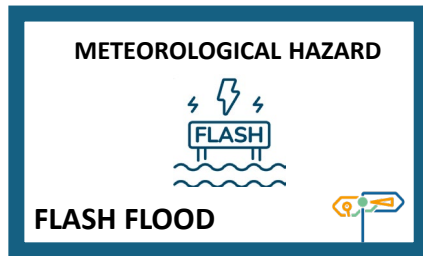
Then consider the additional set of action cards, and see which actions could be taken to:

- anticipate,
- prepare,
- alert and
- respond to the disaster event,

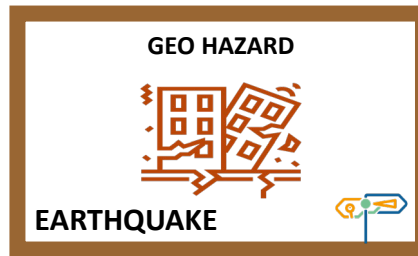
in order to make the impact less. Indicate which parts of the impact chains would change by implementing the action.

Hazard cards

Hydrological & Meteorological (32)



Geological (18)



Environmental (18)



Technological (21)



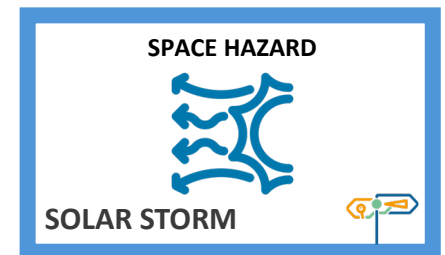
Societal (8)



Biological (8)



Extraterrestrial (6)



Following classification of [UNDRR HIPS](#)

METEOROLOGICAL HAZARD



FLUVIAL FLOOD



METEOROLOGICAL HAZARD



FLASH FLOOD



METEOROLOGICAL HAZARD



COASTAL FLOOD



METEOROLOGICAL HAZARD



FLOODING



METEOROLOGICAL HAZARD



GROUNDWATER
FLOOD



METEOROLOGICAL HAZARD



PLUVIAL FLOOD



METEOROLOGICAL HAZARD



LAKE BREAKOUT
FLOOD



METEOROLOGICAL HAZARD



DRAINAGE FLOOD



METEOROLOGICAL HAZARD



ICING



METEOROLOGICAL HAZARD



FOG



METEOROLOGICAL HAZARD



EXTREME RAINFALL



METEOROLOGICAL HAZARD



THUNDERSTORM/
LIGHTNING



METEOROLOGICAL HAZARD



TORNADO



METEOROLOGICAL HAZARD



TROPICAL STORM



METEOROLOGICAL HAZARD



WIND/STORM

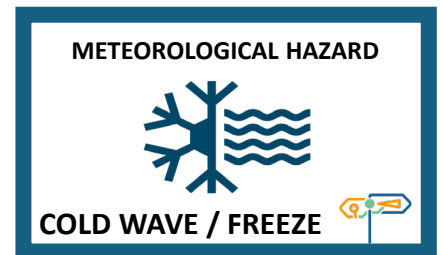
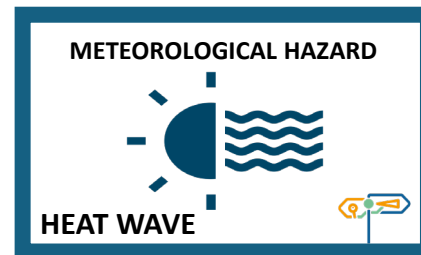
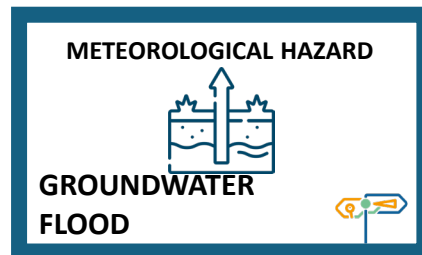
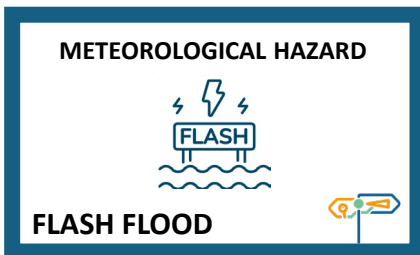
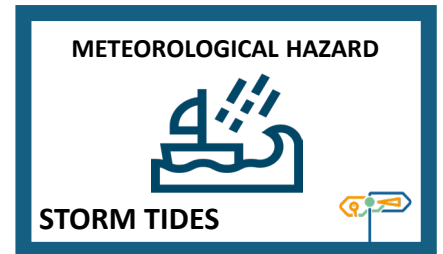
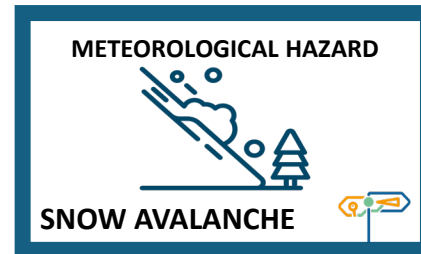
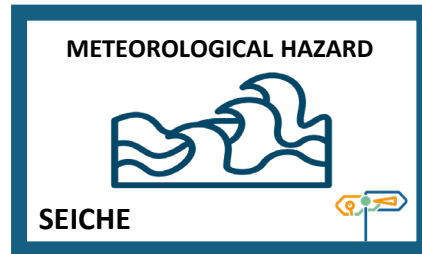
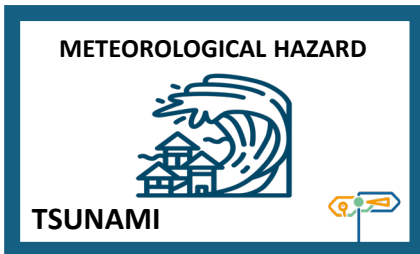
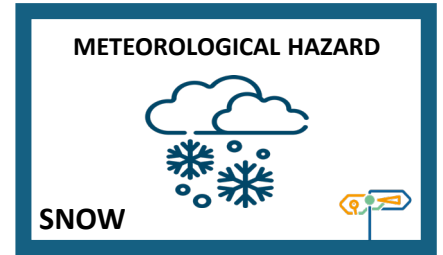
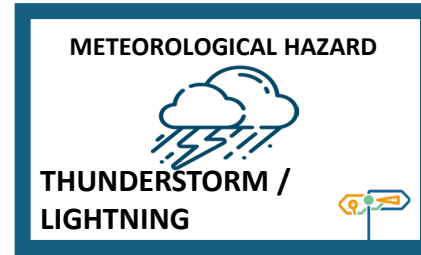
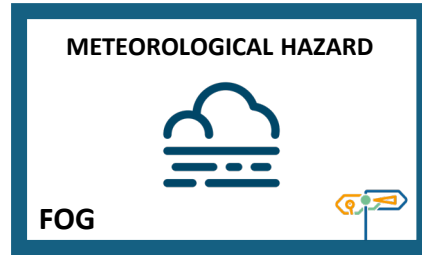
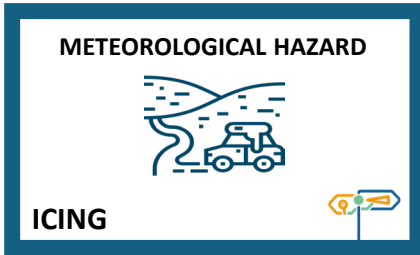
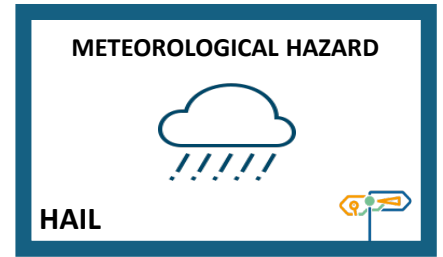
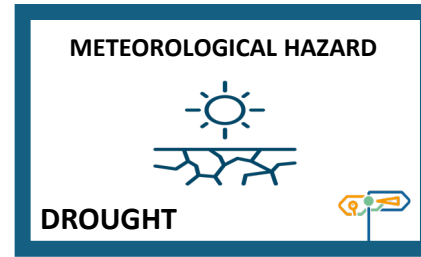
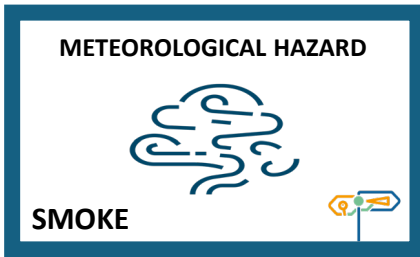


METEOROLOGICAL HAZARD



STORM SURGE





GEO HAZARD



ROCK SLIDE/FALL



GEO HAZARD



DEEP LANDSLIDE



GEO HAZARD



MUDFLOW



GEO HAZARD



DEBRIS AVALANCHE



GEO HAZARD



SHALLOW LANDSLIDE



GEO HAZARD



DEBRISFLOW



GEO HAZARD



LAHAR



GEO HAZARD



PYROCLASTIC FLOW



GEO HAZARD



LAVA FLOW



GEO HAZARD



ASHCLOUD



GEO HAZARD



ASH/TEPHRA FALL



GEO HAZARD



VOLCANIC ERUPTION



GEO HAZARD



EARTHQUAKE



GEO HAZARD



LIQUEFACTION



GEO HAZARD



GROUND GASSES



GEO HAZARD



EARTHQUAKE



GEO HAZARD



GROUND SHAKING



GEO HAZARD



FAULT RUPTURE



ENVIRONMENTAL HAZARD



MANGROVE DECLINE



ENVIRONMENTAL HAZARD



SALINASATION



ENVIRONMENTAL HAZARD



URBAN FIRE



ENVIRONMENTAL HAZARD



LAND DEGRADATION



ENVIRONMENTAL HAZARD



INVASIVE SPECIES



ENVIRONMENTAL HAZARD



WILDFIRE



ENVIRONMENTAL HAZARD



SEA LEVEL RISE



ENVIRONMENTAL HAZARD



AIR POLLUTION



ENVIRONMENTAL HAZARD



BIODIVERSITY LOSS



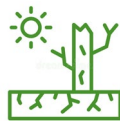
ENVIRONMENTAL HAZARD



CORAL BLEACHING



ENVIRONMENTAL HAZARD



DESERTIFICATION



ENVIRONMENTAL HAZARD



SANDSTORM



ENVIRONMENTAL HAZARD



**PERMAFROST
DECLINE**



ENVIRONMENTAL HAZARD



EROSION



ENVIRONMENTAL HAZARD



DEFORESTATION



ENVIRONMENTAL HAZARD



INVASIVE SPECIES



ENVIRONMENTAL HAZARD



MARINE POLLUTION



TECHNOLOGICAL HAZARD



DAM FAILURE



TECHNOLOGICAL HAZARD



BRIDGE FAILURE



TECHNOLOGICAL HAZARD



RAIL ACCIDENT



TECHNOLOGICAL HAZARD



MINING ACCIDENT



TECHNOLOGICAL HAZARD



DATA BREACH



TECHNOLOGICAL HAZARD



AIR TRANSPORTATION
ACCIDENT



TECHNOLOGICAL HAZARD



DISASTER WASTE



TECHNOLOGICAL HAZARD



ROAD ACCIDENT



TECHNOLOGICAL HAZARD



BUILDING COLLAPSE



TECHNOLOGICAL HAZARD



TELECOMMUNICATION
FAILURE



TECHNOLOGICAL HAZARD



EXPLOSION



TECHNOLOGICAL HAZARD



SUPPLY
CHAIN FAILURE



TECHNOLOGICAL HAZARD



SEEWAGE FAILURE



TECHNOLOGICAL HAZARD



WATER/WASH
SUPPLY FAILURE



TECHNOLOGICAL HAZARD



POLLUTION



TECHNOLOGICAL HAZARD



NUCLEAR ACCIDENT



TECHNOLOGICAL HAZARD



NATECH



TECHNOLOGICAL HAZARD



BLACKOUT



TECHNOLOGICAL HAZARD



CRITICAL
INFRASTRUCTURE
FAILURE



TECHNOLOGICAL HAZARD



CBRNE



TECHNOLOGICAL HAZARD



INDUSTRIAL ACCIDENT



SOCIETAL HAZARD



CIVIL UNREST



SOCIETAL HAZARD



VIOLENCE



SOCIETAL HAZARD



CYBER ATTACK



SOCIETAL HAZARD



FINANCIAL SHOCK



SOCIETAL HAZARD



ENV.
DEGRADATION
FROM CONFLICT



SOCIETAL HAZARD



TERRORIST ATTACK



SOCIETAL HAZARD



ARMED CONFLICT



SOCIETAL HAZARD



**POPULATION
DISPLACEMENT**



SOCIETAL HAZARD



BIOLOGICAL HAZARD



**RESPIRATORY
DISEASES**



BIOLOGICAL HAZARD



**FOODBORNE
DISEASES**



BIOLOGICAL HAZARD



**WATERBORNE
DISEASES**



BIOLOGICAL HAZARD



AIRBORNE DISEASES



BIOLOGICAL HAZARD



PANDEMIC



BIOLOGICAL HAZARD



BIOLOGICAL HAZARD



ANIMAL DISEASES



BIOLOGICAL HAZARD



EPIDEMIC



SPACE HAZARD



SPACE ACCIDENT



SPACE HAZARD



METEORITE



SPACE HAZARD



UV RADIATION



SPACE HAZARD



SOLAR STORM



SPACE HAZARD



AIR BURST



SPACE HAZARD



RADIO BLACKOUT



Vulnerability cards

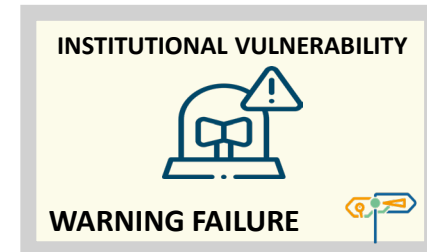
Physical (12)



Social (12)



Institutional (12)



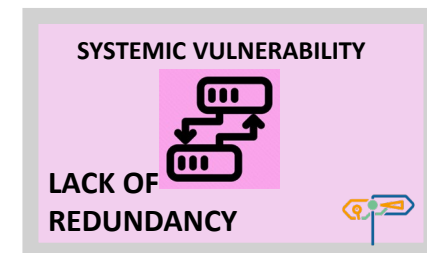
Economic (6)



Environmental (6)



Systemic (8)



Factors contributing to susceptibility to damage and loss

PHYSICAL VULNERABILITY



LACK OF PROTECTION



PHYSICAL VULNERABILITY



INSUFFICIENT
PROTECTION



PHYSICAL VULNERABILITY



POOR DESIGN



PHYSICAL VULNERABILITY



NO BUILDING CODES



PHYSICAL VULNERABILITY



NO
BUILDING CONTROL



PHYSICAL VULNERABILITY



UNREGULATED
LAND USE



PHYSICAL VULNERABILITY



POOR QUALITY
CONSTRUCTION



PHYSICAL VULNERABILITY



RAPID DEVELOPMENT



PHYSICAL VULNERABILITY



PHYSICAL VULNERABILITY



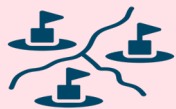
PHYSICAL VULNERABILITY



PHYSICAL VULNERABILITY



SOCIAL VULNERABILITY



MARGINALIZATION



SOCIAL VULNERABILITY



MIGRATION



SOCIAL VULNERABILITY



LACK OF AWARENESS



SOCIAL VULNERABILITY



UNEMPLOYMENT



SOCIAL VULNERABILITY



SHORTAGE
OF SHELTERS



SOCIAL VULNERABILITY



POVERTY



SOCIAL VULNERABILITY



AGEING POPULATION



SOCIAL VULNERABILITY



INEQUALITY



SOCIAL VULNERABILITY



LACK OF AWARENESS



SOCIAL VULNERABILITY



SOCIAL VULNERABILITY



SOCIAL VULNERABILITY



INSTITUTIONAL VULNERABILITY



LACK OF
TRAINED STAFF



INSTITUTIONAL VULNERABILITY



FORECASTING
FAILURE



INSTITUTIONAL VULNERABILITY



POOR
COMMUNICATION



INSTITUTIONAL VULNERABILITY



RAPID URBANIZATION



INSTITUTIONAL VULNERABILITY



WARNING FAILURE



INSTITUTIONAL VULNERABILITY



EVACUATION FAILURE



INSTITUTIONAL VULNERABILITY



FARMLAND
ABANDONMENT



INSTITUTIONAL VULNERABILITY



INSTITUTIONAL VULNERABILITY



INSTITUTIONAL VULNERABILITY



INSTITUTIONAL VULNERABILITY



INSTITUTIONAL VULNERABILITY



ECONOMIC VULNERABILITY



**DEPENDENCE ON A
SINGLE INDUSTRY**



ECONOMIC VULNERABILITY



RURAL LIVELIHOOD



ECONOMIC VULNERABILITY



**UNINSURED
ECONOMIC SECTOR**



ECONOMIC VULNERABILITY



ECONOMIC VULNERABILITY



ECONOMIC VULNERABILITY



ENVIRONMENTAL VULNERABILITY



MONOCULTURE



ENVIRONMENTAL VULNERABILITY



**LACK OF PROTECTIVE
FOREST MEASURES**



ENVIRONMENTAL VULNERABILITY



**LACK OF
ENV. REGULATION**



ENVIRONMENTAL VULNERABILITY



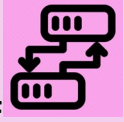
ENVIRONMENTAL VULNERABILITY



ENVIRONMENTAL VULNERABILITY



SYSTEMIC VULNERABILITY



**LACK OF
REDUNDANCY**



SYSTEMIC VULNERABILITY



**LACK OF
ROBUSTNESS**



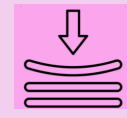
SYSTEMIC VULNERABILITY



LONG RECOVERY



SYSTEMIC VULNERABILITY



LOW RESILIENCE



SYSTEMIC VULNERABILITY



SYSTEMIC VULNERABILITY



SYSTEMIC VULNERABILITY



SYSTEMIC VULNERABILITY



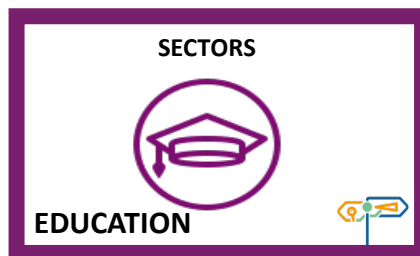
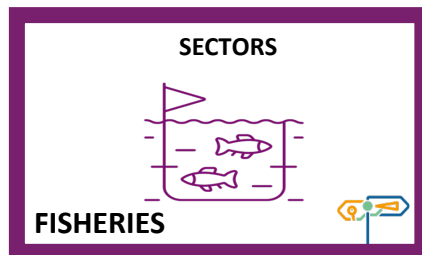
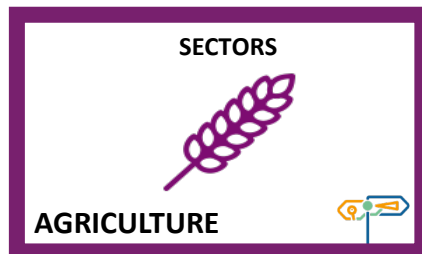
Sector cards

- Productive
 - Agriculture, Commerce, Industry, Tourism
- Social
 - Housing, Education, Health, Culture
- Infrastructure
 - Water&Sanitation, Energy, Transport, Telecom
- Cross-cutting
 - Governance, Environment, DRR, Employment & livelihood

Count: 16

Classification based on PDNA (Post Disaster Needs Assessment)





SECTORS



TELECOMMUNICATION



SECTORS



GOVERNANCE



SECTORS



SECTORS



DRR



SECTORS



EMPLOYMENT/
LIVELIHOODS



SECTORS



LAW



SECTORS



GOVERNANCE



SECTORS



TRANSPORTATION



SECTORS



CULTURAL HERITAGE



SECTORS



ENVIRONMENT



SECTORS



LIVESTOCK



SECTORS



DISASTER RESPONSE



SECTORS



SECTORS



SOCIETY



SECTORS



FINANCE



SECTORS



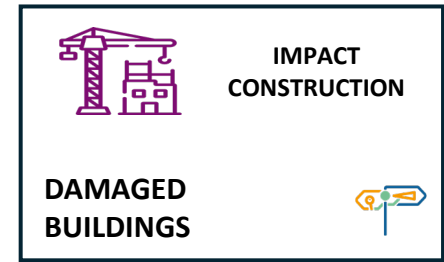
CONSTRUCTION



Impact cards

- In Built-up environment / Construction
- Infrastructure (14)
- Social sector (health, education, culture)(12)
- Productive sector (agriculture, commerce, finance, industry, tourism) (22)
- Environment (11)
- Disaster Risk Reduction (13)

Empty cards to write missing damage and loss





**IMPACT
CONSTRUCTION**

**COLLAPSE OF
BUILDINGS**



**IMPACT
CONSTRUCTION**

**DAMAGED
BUILDINGS**



**IMPACT
CONSTRUCTION**

LOSS OF FUNCTION



**IMPACT
CONSTRUCTION**

**NOT SUFFICIENT
SKILLED WORKERS**



**IMPACT
CONSTRUCTION**

**INSUFFICIENT
RESOURCES**



**IMPACT
CONSTRUCTION**

**DEBRIS
MANAGEMENT**



**IMPACT
TRANSPORTATION**

COLLAPSE OF BRIDGES



**IMPACT
TRANSPORTATION**

ROAD BLOCKAGE



**IMPACT
INFRASTRUCTURE**

**DAMAGE TO
CRITICAL
INFRASTRUCTURE**



**IMPACT
INFRASTRUCTURE**

**DISRUPTION OF
ESSENTIAL SERVICES**



**IMPACT
TRANSPORTATION**

**NON-FUNCTIONAL
HELIPADS**



**IMPACT
TRANSPORTATION**

**NON-FUNCTIONAL
AIRPORT FACILITIES**



**IMPACT
TRANSPORTATION**

**TRANSPORTATION
INTERRUPTED**



**IMPACT
TRANSPORTATION**

**TRANSPORTATION
ELEMENTS DESTROYED**



**IMPACT
TRANSPORTATION**

**NON-FUNCTIONAL
HARBOUR FACILITIES**



**IMPACT
TRANSPORTATION**

**NON-FUNCTIONAL
RAILWAYS**





IMPACT
HEALTH

DISRUPTION OF
HEALTHCARE
SERVICES



IMPACT
HEALTH

SPREAD OF DISEASES



IMPACT
HEALTH

FOOD INSECURITY



IMPACT
HEALTH

INSUFFICIENT
PHARMACEUTICAL
RESOURCES



IMPACT
GOVERNANCE

MANIPULATION OF
PUBLIC OPINION



IMPACT
GOVERNANCE

ADMINISTRATIVE
BUILDINGS NOT
OPERATIONAL



IMPACT
GOVERNANCE

ADMINISTRATIVE
BUILDINGS
DESTROYED



IMPACT
GOVERNANCE

LACK OF TRUST IN
THE GOVERNMENT



IMPACT
GOVERNANCE

POLITICAL
INSTABILITY



IMPACT
GOVERNANCE

INTERNATIONAL
AID/LOANS



IMPACT
GOVERNANCE

DISRUPTION OF
ESSENTIAL SERVICES



IMPACT
SOCIETY

MORTALITY



IMPACT
SOCIETY

MORBIDITY



IMPACT
SOCIETY

REDUCTION IN
PSYCHOLOGICAL AND
SOCIAL WELL-BEING



IMPACT
SOCIETY

DISABILITY



IMPACT
SOCIETY

SOCIAL INEQUALITY





IMPACT
SOCIETY

SOCIAL INSTABILITY



IMPACT
SOCIETY

DISPLACEMENT



IMPACT
SOCIETY

UNEXPECTED
MIGRATION FLOW



IMPACT
SOCIETY

CIVIL UNREST



IMPACT
TOURISM

REDUCTION IN
TOURISM



IMPACT
TOURISM

CHANGE IN USAGE



IMPACT
CULTURAL
HERITAGE

DAMAGED
CULTURAL HERITAGE



IMPACT
CULTURAL
HERITAGE

LOSS OF CULTURAL
HERITAGE



IMPACT
CULTURAL
HERITAGE

LOSS IN TRADITIONS



IMPACT
CULTURAL
HERITAGE

LOSS OF CULTURAL
NETWORKS



IMPACT
FINANCE

ECONOMIC
DISRUPTION



IMPACT
FINANCE

BANKRUPTCY



IMPACT
FINANCE

NO ACCESS TO CASH



IMPACT
FINANCE

INCREASED DEBT



IMPACT
FINANCE

NO INSURANCE
PAYMENT



IMPACT
FINANCE

EXCESSIVE
INSURANCE CLAIMS





IMPACT
FINANCE

**DISRUPTION OF
ECONOMIC GROWTH
AND DEVELOPMENT**



IMPACT
FINANCE

FINANCIAL CRISIS



IMPACT
FINANCE

**SUPPLY-CHAIN
DISRUPTIONS**



IMPACT
FINANCE

INFLATION



IMPACT
FINANCE

UNEMPLOYMENT



IMPACT
FINANCE



IMPACT
FINANCE

**DISRUPTION IN
MANUFACTURING**



IMPACT
FINANCE

**INCREASE IN
FOREIGN DEBT**



IMPACT
AGRICULTURE

**DISRUPTION OF
AGRICULTURE**



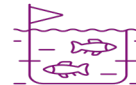
IMPACT
AGRICULTURE

LOSS OF CROP YIELD



IMPACT
AGRICULTURE

**CROP
DISEASES/PLAGUES**



IMPACT
FISHERIES

**DISRUPTION OF
FISHERIES**



IMPACT
LIVESTOCK

LIVESTOCK KILLED



IMPACT
LIVESTOCK

LIVESTOCK DISEASES



IMPACT
LIVESTOCK

LOSS OF LIVELIHOOD



IMPACT
AGRICULTURE

**INCREASED FOOD
PRICES**





**IMPACT
INDUSTRIES**

**DAMAGE TO
INDUSTRIAL FACILITIES**



**IMPACT
INDUSTRIES**

LOSS OF PRODUCTION



**IMPACT
INDUSTRIES**

**SUPPLY-CHAIN
INTERRUPTION**



**IMPACT
INDUSTRIES**

**SAFETY BREACHES IN
HAZARDOUS
INDUSTRIES**



**IMPACT
EDUCATION**

**DISRUPTION IN
EDUCATION AND
SKILL DEVELOPMENT**



**IMPACT
EDUCATION**

**DAMAGED SCHOOL
BUILDINGS**



**IMPACT
EDUCATION**

**COLLAPSED SCHOOL
BUILDINGS**



**IMPACT
EDUCATION**

**LACK OF TRAINED
STAFF**



**IMPACT
ENVIRONMENT**

LAND DEGRADATION



**IMPACT
ENVIRONMENT**

HABITAT LOSS



**IMPACT
ENVIRONMENT**

BIODIVERSITY LOSS



**IMPACT
ENVIRONMENT**

MARINE POLLUTION



**IMPACT
ENVIRONMENT**

AIR POLLUTION



**IMPACT
ENVIRONMENT**

**GROUNDWATER
CONTAMINATION**



**IMPACT
ENVIRONMENT**

LOSS OF FORESTS



**IMPACT
ENVIRONMENT**

SOIL EROSION





**IMPACT
ENVIRONMENT**

**REDUCED LAND
FERTILITY**



**IMPACT
ENVIRONMENT**

**LOSS OF ECOSYSTEM
SERVICES**



**IMPACT
ENVIRONMENT**

**LOSS OF FRESHWATER
RESOURCES**



**IMPACT
DISASTER RESPONSE**

**RESCUE OPERATIONS
INTERRUPTED**



**IMPACT
DISASTER RESPONSE**

**TEMPORARY
SHELTERS MADE**



**IMPACT
DISASTER RESPONSE**

**TEMPORARY MEDICAL
FACILITIES DISRUPTED**



**IMPACT
DISASTER RESPONSE**

**COMMUNICATION
INTERRUPTED**



**IMPACT
DISASTER RESPONSE**

**INSUFFICIENT SHELTER
CAPACITY**



**IMPACT
DISASTER RESPONSE**

**INSUFFICIENT RESCUE
RESOURCES**



**IMPACT
DISASTER RESPONSE**

**INSUFFICIENT WASH
FACILITIES**



**IMPACT
DISASTER RESPONSE**

**INTERRUPTION IN
POWER SUPPLY**



**IMPACT
DISASTER RESPONSE**

**INTERRUPTION IN
COMMUNICATION**



**IMPACT
DISASTER RESPONSE**

**INTERRUPTION IN
WATER SUPPLY**



**IMPACT
DISASTER RESPONSE**

EVACUATION FAILURE



**IMPACT
DISASTER RESPONSE**

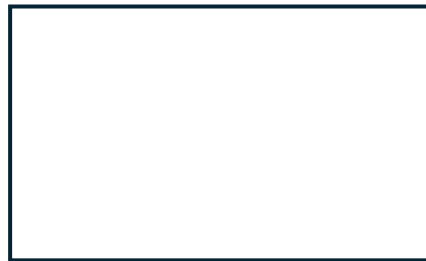
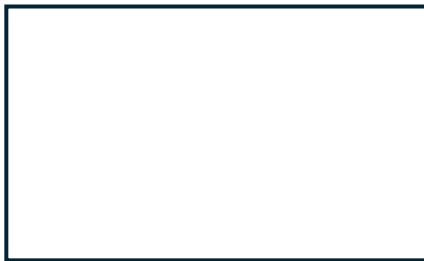
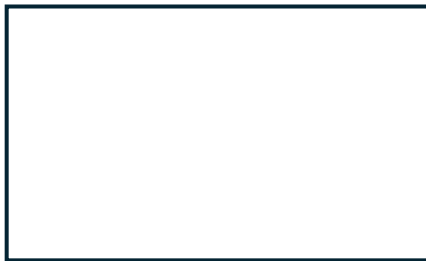
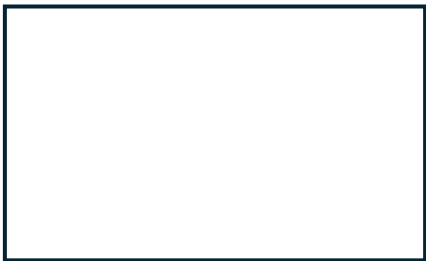
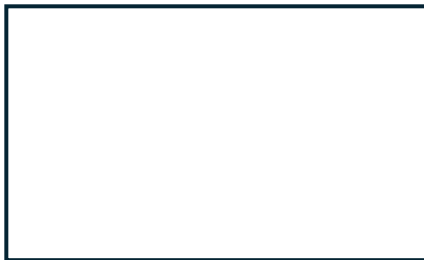
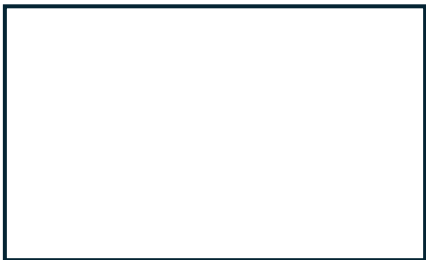
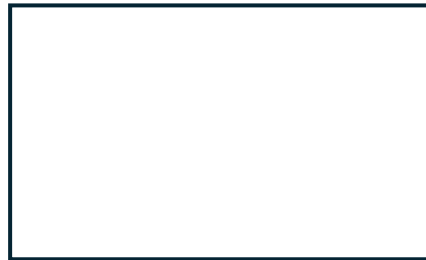
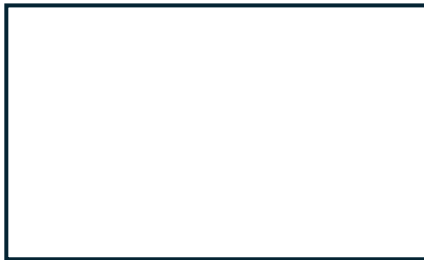
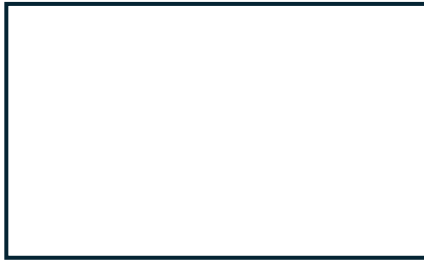
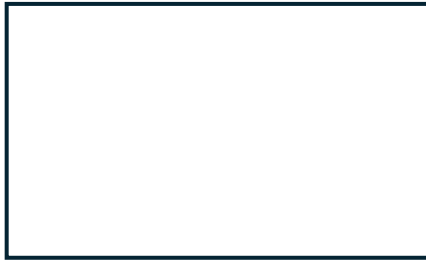
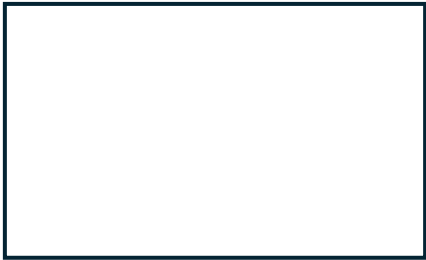
**INTERNALLY
DISPLACE PERSONS**



**IMPACT
DISASTER RESPONSE**

**INSUFFICIENT SHELTER
CAPACITY**



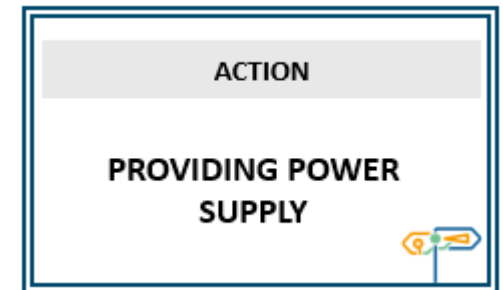


Action cards

Which actions could be taken to change the impact chain?

Empty cards to write missing damage and loss

Count: 64



ACTION

**PROVIDING POWER
SUPPLY**



ACTION

**DISTRIBUTING EMERGENCY
FUNDS**



ACTION

**DISBURSING INSURANCE
FUNDS**



ACTION

RESCUING SURVIVORS



ACTION

PARTIAL RELOCATION



ACTION

**COLLECTING SPARE
MATERIALS FOR REPAIR**



ACTION

**VULNERABILITY
ASSESSMENT**



ACTION

**DEFINING THE EMERGENCY
ROAD NETWORK**



ACTION

**EVACUATION OF PEOPLE
AND PETS**



ACTION

**ORGANIZING BUSES AND
DRIVERS**



ACTION

**MOBILISING EMERGENCY
PERSONNEL**



ACTION

**MOBILISING HEAVY
MACHINES**



ACTION

**MOBILISING SEARCH
AND RESCUE TEAMS**



ACTION

**MOBILISING EMERGENCY
MATERIALS**



ACTION

**MOBILISING
FOOD/WATER/BLANKET, ETC.**



ACTION

**MOBILISING FOREIGN
RESCUE TEAMS**



ACTION

**TRANSFERRING INJURED
PEOPLE TO THE HOSPITAL**



ACTION

**EVACUATION OF RESCUED
PEOPLE TO SAFE AREAS**



ACTION

BURYING DEAD BODIES



ACTION

DAMAGE ASSESSMENT



ACTION

RESTORING THE DAMAGE



ACTION

REPAIRING



ACTION

RECONSTRUCTING



ACTION

**BUILDING STRUCTURAL
MITIGATION MEASURES**



ACTION

**PREPARING HAZARD MAPS
AT DIFFERENT SCALES**



ACTION

**CONSIDERATION OF
MULTI-HAZARD**



ACTION

**CONSIDERATION OF
CLIMATE CHANGE**



ACTION

**ESTABLISHING A
MONITORING NETWORK**



ACTION

**RESTRICTING
DEVELOPMENT WITHIN
THE HAZARD ZONE**



ACTION

**DEFINING THE HAZARD
ZONES**



ACTION

**SELECTING DEVELOPMENT
AREAS OUTSIDE HAZARD
ZONES**



ACTION

LAND ACQUISITION



ACTION

LAND USE ORDINANCES



ACTION

DENSITY RESTRICTIONS



ACTION

COMMUNITY RELOCATION



ACTION

**PREPARING DISASTER
MANAGEMENT PLAN**



ACTION

RELIEF FUNDS



ACTION

**RESTORING PRE-DISASTER
SITUATION**



ACTION

**FACILITATING PERMANENT
RETURN OF RESIDENTS**



ACTION

**BUSINESS CONTINUITY
PLAN**



ACTION

**CONTINGENCY PLAN FOR
NA-TECH**



ACTION

**CREATION OF GREEN AND
BLUE SPACES TO REDUCE
DISASTER RISK**



ACTION

**DECREASING THE DEGREE OF
LIFELINE DEPENDENCY OF
PRODUCTION SITES**



ACTION

**INCREASING ECONOMIC
CAPACITY TO RESPOND THE
CRISIS**



ACTION

**INVEST IN RECOVERY AND
TAKE PREVENTION
ACTIONS**



ACTION

**ESTABLISHING PROTOCOLS
FOR THE USE
OF RESOURCES**



ACTION

**INDIVIDUAL CONTINGENCY
PLANS**



ACTION

FORECASTING HAZARD



ACTION

MONITORING HAZARD



ACTION

DISSEMINATING WARNING



ACTION

**TRAINING ON HOW TO READ
WARNINGS AND
TO ACT DURING
EMERGENCIES**



ACTION

**ESTABLISHING A
COMMUNITY NETWORK**



ACTION

**DEFINING THE
RESPONSIBILITIES OF
INSTITUTIONS
CLEARLY**



ACTION

MAPPING THE DAMAGE



ACTION

**QUICK SURVEY ON
DAMAGED PARTS**



ACTION

**DAMAGE AND LOSS
ASSESSMENT**



ACTION

RECONSTRUCTION



ACTION

**BUILDING CODES FOR
NEW CONSTRUCTION**



ACTION

**INCORPORATE RECOVERY
MEASURES IN URBAN
DEVELOPMENT
PLANS**



ACTION

**SHARING RECONSTRUCTION
PLANS AMONG
STAKEHOLDERS**



ACTION

**TRAINING PERSONNEL
FOR REPAIR WORK**



ACTION

**PROTOCOLS TO PROCEED
FOR REPAIRS REQUIRING
INTER-LIFELINES
INTERVENTION**



ACTION

ACCESS TO FUNDS



ACTION

**PROVIDING WORK FOR
THOSE WHO LOSS THEIR
WORK**



ACTION

**HEALING INJURED AND
TRAUMATIZED
COMMUNITY**



ACTION

**BRINGING TOGETHER
SEPARATED FAMILIES**



ACTION

**IDENTIFYING DEAD
PEOPLE**



ACTION

**WORKING ON THE
TRANSPARENCY OF FUNDS**



ACTION

**LEARNING FROM THE PAST
EVENTS**



ACTION

RE-ZONING



ACTION

**ENHANCING EARLY
WARNING SYSTEMS**



ACTION

**REHABILITATION OF
DISPLACED PEOPLE**



ACTION

**ACTIVATING MEDICAL
FACILITIES**



ACTION



ACTION



ACTION



ACTION



ACTION



ACTION

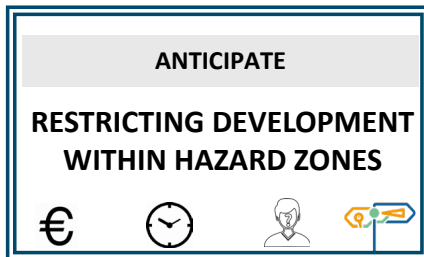


ACTION

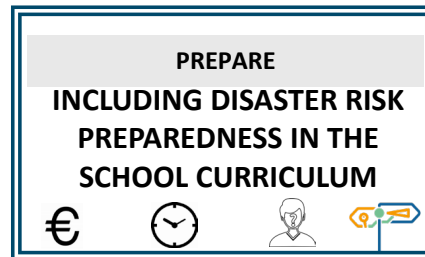


5 Resilience Goals

Anticipate (7)



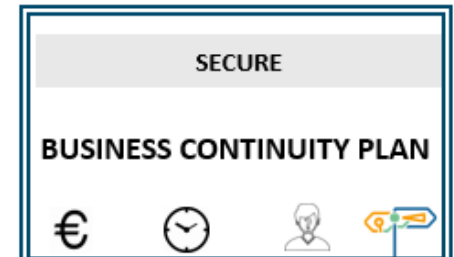
Prepare (9)



Alert (9)



Secure (5)



Respond (9)



Which actions could be taken to change the impact chain?

Empty cards to write missing damage and loss

ANTICIPATE

**RESTRICTING DEVELOPMENT
WITHIN HAZARD ZONES**



PREPARE

**INCLUDING DISASTER RISK
PREPAREDNESS IN THE
SCHOOL CURRICULUM**



ALERT

**CONSIDERATION OF
MULTI-HAZARDS IN EARLY
WARNING PLANS**



RESPOND

RESTORING THE DAMAGE



ANTICIPATE

**ESTABLISHING AN
INSURANCE SYSTEM**



PREPARE

**ESTABLISHING A
COMMUNITY NETWORK**



ALERT

**MONITORING HAZARDS
TO ADJUST WARNING**



RESPOND

DAMAGE ASSESSMENT



ANTICIPATE

**PREPARING MULTI-HAZARD
MAPS AT DIFFERENT SCALES**



SECURE

**STRESS TESTING
EMERGENCY OPERATION
SYSTEMS**



SECURE

**ESTABLISHING A CIVIL
PROTECTION SYSTEM THAT
REMAINS OPERATIONAL 7/24**



SECURE

BUSINESS CONTINUITY PLAN



ANTICIPATE

VULNERABILITY ASSESSMENT



PREPARE

TRAINING PUBLIC



ALERT

DISSEMINATING WARNING



RESPOND

REPAIRING



ANTICIPATE

**PREPARING MULTI-HAZARD
MAPS AT DIFFERENT SCALES**



PREPARE

**DEFINING THE
RESPONSIBILITIES OF
INSTITUTIONS CLEARLY**



ALERT

**ESTABLISHING AN EARLY
WARNING NETWORK**



RESPOND

**MOBILIZING THE RESOURCES
AND EMERGENCY PERSONNEL**



SECURE

**ENSURING COORDINATION
ACROSS SECTORS**



PREPARE

**ESTABLISHING A EUROPEAN
AWARENESS PROGRAM FOR
RESILIENCE**



ALERT

**LINKING EARLY GLOBAL
WARNING WITH LOCAL
ACTIONS IN EUROPE**



RESPOND

**EVACUATION OF RESCUED
PEOPLE**



ANTICIPATE



PREPARE



ALERT



RESPOND



SECURE



PREPARE




ALERT




RESPOND



ANTICIPATE



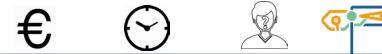
PREPARE




ALERT




RESPOND



ANTICIPATE




PREPARE




ALERT




RESPOND




ANTICIPATE




PREPARE




ALERT




RESPOND




SECURE




SECURE



SECURE



SECURE



Feedback



- Your feedback is very welcome. Please contact us:
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- Cees van Westen: C.J.Vanwesten@utwente.nl



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