Assessment Tool
for Tsunami Incidents and Exercises at the local level

Guiding questions and tips for evaluating community preparedness capacity and response in tsunami related incidents or exercises

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About this Tool

This assessment tool has been developed in the frame of the TsunamiRisk Project, an Indonesian-German research initiative implemented between 2022 and 2024, and is designed to guide the evaluation of community preparedness capacity and response in any type of tsunami related incidents or exercises.

Although derived largely from Indonesian experiences, the team of authors, Semeidi Husrin and Rahma Hanifa (BRIN), Irina Rafliana (IDOS) and Harald Spahn (Consultant for GFZ), is confident that it can be applied globally as the challenges communities face in different parts of the world to prepare for tsunamis seems largely comparable.

Introduction

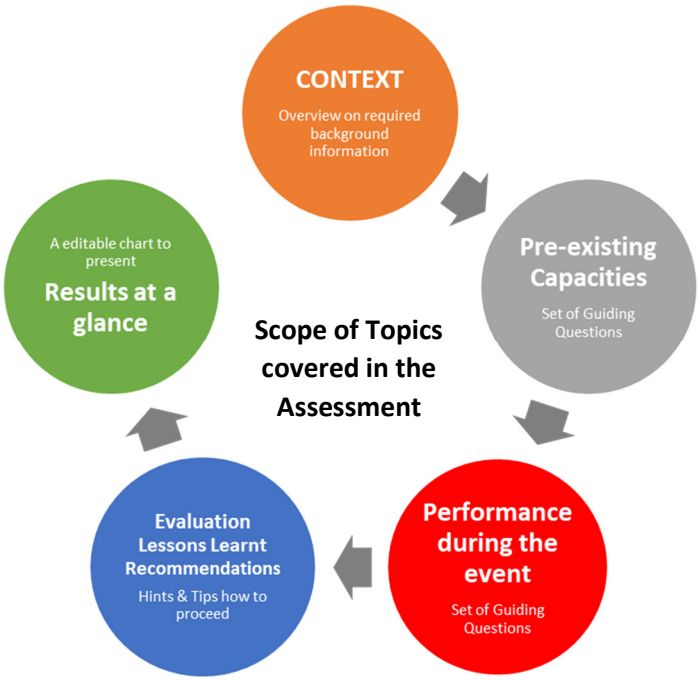
Background and purpose of the tool

A rapid assessment immediately after a tsunami related incident and the involvement of local stakeholders from the affected areas in the assessment are important elements for capturing the experiences and drawing important lessons that can be learnt to improve tsunami preparedness and end-to-end tsunami early warning.

Against this backdrop, a tool has been developed, which can guide such assessments in a structured and comprehensive way. The tool contains a set of guiding questions that can be applied for a range of incidents that have posed a tsunami threat at the community level. This can include incidents where a tsunami was generated, but also incidents where an earthquake was strongly felt or a tsunami warning was issued, but ultimately no tsunami occurred. Such an assessment will usually focus on a specific geographical area that has been affected or impacted by an incident. This may be a town, a district, a village or more than one of these.

Additionally, the tool can also be used to evaluate tsunami warning and emergency response exercises as the aspects to be evaluated are largely similar.

The assessment of tsunami related incidents or tsunami exercises requires not only an examination of the situation and response actions during the incident, but also a good understanding of the pre-existing capacities and the status of tsunami preparedness in the assessment area at the time of the incident or exercise. A special section of the tool looks at this and is aligned with the set of indicators, which has been developed for the IOC Tsunami Ready Initiative.



This tool, with its focus on the end-to-end warning chain and community response issues, may complement the IOC Post-Tsunami Survey Guidelines, which look mainly at the impact of the tsunami after a destructive event.

Some hints for practical application

There are a number of ways to organise assessments on community preparedness and response to tsunami-related incidents or exercises. Following strong and destructive tsunamis, International Tsunami Survey Teams (ITST) may be organised and deployed, while on other occasions, national teams or individual organisations may be mobilised. DMOs may be interested to learn about local preparedness strategies and NTWCs, as warning service provider, may want to know if their warning service is effective for end users, who are ultimately their most important customers. It can also simply be a local initiative where a community wants to learn from an incident. Whether an assessment can be professionally supported depends on whether appropriate experts can be brought in and on the extent to which financial resources are made available.

The tool is suitable for all these cases. It can guide assessment teams led by external experts for a more comprehensive analysis but can also be used as a self-assessment tool for local stakeholder.

It is considered important to do assessments shortly after an incident or exercise in order to ensure that fresh impressions and detailed information can be captured. Assessments should be done in a structured and participatory manner, involving all main stakeholder. Assessment methods may include interviews with relevant authorities, focus group discussions with stakeholder groups, field observations, questionnaires to capture community reaction and study of reference documents (hazard, risk and evacuation maps, SOPs, disseminated warning messages) as well as media reports.

The assessment needs always to be tailored to the specific conditions of the incident, the socio-cultural setting and the available resources. Please note that not all aspects relevant for the assessment of incidents apply for exercises.

The focus should be on learning together to improve community tsunami preparedness. It is therefore important to avoid finger-pointing and blame games, and to focus on possible practical improvements.

If such assessments are to be scientifically supported, there is a need to ensure that the process and results are useful learning opportunities for all stakeholders, and not just an academic exercise. In this regards, we want to draw your attention to an initiative called the “Disaster Studies Manifesto: Power, Prestige and Forgotten Values” which calls for a change in the approach to researching disasters in order to inspire and inform more respectful, reciprocal and genuine relationships between “local” and “external” researchers in disaster studies and linked fields. The initiative (https://www.radixonline.org/manifesto-accord) raises a number of questions that should help disaster studies to become more inclusive and collaborative, and thereby contribute more fully to disaster risk reduction.

Part 1: Context Information

This section provides an overview of the background information that needs to be considered when conducting the assessment. This includes a description on the tsunami related incident or exercise that prompted the assessment and specifies the communities, which are assessed. It further summarizes the set-up of the national warning chain, the timeline and sequence of warning messages issued by the National Tsunami Warning Center (NTWC) for the particular incident and provides copies of full warning message texts in an annex. It also informs on the methods used in the assessment and the sources of information.

1.1. Description of the Incident / Exercise

In case of a Tsunami related Incident:

- ✓ Date, location of incident, type of incident and type of trigger mechanism (seismic / non-seismic), timeline
- ✓ Overall impacts generated by the incident
- ✓ Geographical demarcation for the assessment: communities which participate / are covered in the assessment
- ✓ Impacts suffered by these communities

In case of a Tsunami Exercise:

- ✓ Name of exercise, organizers, date of the exercise,
- ✓ Exercise scenario, type of exercise, target groups
- ✓ Communities which participate in the exercise and assessment

1.2. Set-up of national warning chain and sequence of warnings issued by the NTWC

- ✓ Graphical representation of the end-to-end warning chain (see Reference 1)
- ✓ Overview of the sequence of messages with timeline and main contents (i.e. warning levels, warning segments) for the incident or exercise being assessed (see Reference 2)
- ✓ Match of prediction with real situation (only in cases of real incidents)
- ✓ Collect copies of full warning messages (see Reference 3)

1.3. Methods of the assessment and sources of information used

- ✓ Time period of the assessment (dates)
- ✓ Interview partner
- ✓ Focus group discussions
- ✓ Own observation
- ✓ Reports used (list all sources in Reference 4)

Part 2: Analysing pre-existing capacities at community level at the time of the incident or exercise

This section look at the existing capacities that have been already in place in the assessed communities at the time of the incident or exercise. The aspects to be assessed cover all elements included in the set of indicators developed and applied by the IOC Tsunami Ready Recognition Programme.

2.1. Local risk knowledge

- ✓ Tsunami hazard zones are mapped and designated? Does it include information about lead times? Does the hazard map consider all relevant seismic and non-seismic tsunami sources?
- ✓ Number of people at risk in tsunami hazard zone are estimated? Have vulnerable groups, daytime and night-time populations, seasonal fluctuations and tourists been taken into account?
- ✓ Had economic, infrastructural, political and social resources been identified?
- ✓ What is the status of risk knowledge at community level (including local wisdom), did it cover the type of event that happened?

2.2. Warning service capacities at the local disaster management organization (LDMO)

- ✓ Are institutional arrangements and standard operation procedures (SOPs) in place for warning reception, decision making and dissemination?
- ✓ Are redundant and reliable means in place to timely receive official tsunami warnings and distribute official tsunami warnings and advice to public round the clock (24/7)?

2.3. Evacuation capacities

- ✓ Is an easily understood and officially approved tsunami evacuation map available and accessible?
- ✓ Are evacuation routes signposted?
- ✓ Is evacuation infrastructure available?

2.4. Emergency response capacities

- ✓ Is a tsunami contingency plan in place that is officially approved and known to the relevant stakeholders?
- ✓ Is appropriate capacity to manage emergency response operation during a tsunami in place?

2.5. Tsunami awareness and knowledge of the population

- ✓ Is tsunami information including signage is publicly displayed?
- ✓ Are outreach and public awareness and education resources are available and distributed?
- ✓ Are outreach or educational activities held at least 3 times/year?
- ✓ Is a community tsunami exercise conducted at least every 2 years?

A list with more detailed aspects related to the Tsunami Ready Indicators can be found in the Standard Guidelines for the Tsunami Ready Recognition Programme (IOC Manual and Guideline 74) in Annex 2 (Form 2 "Fulfilment of the Indicators").

Part 3: Performance assessment during an incident or exercise

This section examines the warning processes and response that occurred during the incident or exercise. In particular, it looks at the performance of the **tsunami warning chain** at the local level with special emphasis on the LDMO regarding reception of warnings from the NTWC, decision making for evacuation and timely dissemination of warning information and guidance to the community. The graphical representation of the national end-to-end tsunami warning chain (where available) is an important reference for analysing and assessing the warning process that has actually taken place.

3.1. Warning dissemination process from NTWC to the local level / LDMO

- ✓ What dissemination channels have been used by the NTWC and have they been successful in linking up with the local level / LDMO?
- ✓ Was NTWC warning information disseminated by national and local media?
- ✓ Have NTWC warnings (for the entire sequence of warnings) been received in a timely manner at the local level?

3.2. Warning process at the local level / LDMO

- ✓ Was the LDMO operative during event?
- ✓ How did the LDMO receive the warning (time, channel, content)?
- ✓ Was there an appropriate and timely decision making by the LDMO to disseminate warnings or to call for evacuation?
- ✓ Have warnings and advice been disseminated to communities? What further action has been taken by the LDMO?
- ✓ Timeliness and appropriateness of warnings / information disseminated by the LDMO?
- ✓ What was the overall performance of the LDMO and problems did they encounter?

3.3. Performance of Broadcast Media in warning dissemination at the local level

- ✓ Did the broadcast media provide information in a timely and correct manner?

This section further looks at the **community response** to natural warning signs, warnings from local authorities as well as from media or other sources:

3.4. Early actions taken by other local actors to respond to the warning / tsunami threat

- ✓ Did other local institutions (police, fire brigades, Search & Rescue …) support warning dissemination and evacuation processes?
- ✓ Did the private sector (i.e. tourism) reacted appropriately within their area of responsibility?
- ✓ Did non-governmental organisations (NGOs) or community organisations get involved?

3.5. Warning reception by people in risk areas (from BMKG, Media, LDMO, via Social Media)

- ✓ Reception of warnings (how, from whom, when, timeliness)?
- ✓ Understanding of warnings (contents of warnings and interpretation)?

3.6. Community Reaction

- ✓ Response to natural warning signs by people in risk areas?
- ✓ Timely reaction to warnings from LDMO, Media and other sources?
- ✓ How did the evacuation process work?

3.7. Level of panic and confusion at community level

Part 4: Evaluation, Lessons to be learnt and Recommendations

This section provides hints how to evaluate the findings and how to translate them into lessons to be learnt and recommendations. Ideally, these conclusions will be identified in a participatory way together with the local stakeholder during the assessment process, but they can also be enriched with observations on specific issues based on reflections within the assessment team.

4.1. Evaluation of findings

- ✓ Summarize the **key findings** from the point of view of the assessment team and communities
- ✓ In order to get a quick and comprehensive overview of the assessment results, you may consider using a **colour coding** system. It is suggested to use a simple logic with four levels (see box below) for each of the aspects of capacity and performance assessment. A list of indicators is provided for each of the aspects to be assessed, which will guide the assignment of the appropriate colour code in a coherent way (see Reference 5).

Colour coding for Capacity Assessment
Fully implemented and working
Largely implemented, but with minor problems
Partly implemented, with major problems
Not implemented yet

Colour coding for Performance Assessment
Good
Fair, with minor problems
Major problems
Failure or critical problem

4.2. Lessons to be learnt and recommendations from the incident / exercise

- ✓ Identify problematic issues that have occurred and need to be addressed to help prevent similar conditions occurring at future events.
- ✓ Conduct a thorough analysis of the identified issues and the underlying causes.
- ✓ Develop a set of recommendations for improvement.
- ✓ There should be close dialogue with local actors and national stakeholders in the analysis and identification of lessons and recommendations.

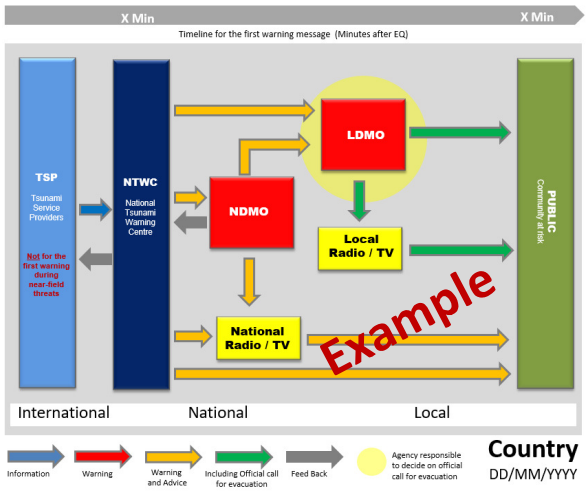
4.3. Final observations on specific issues

- ✓ Document specific issues related to the incident/warning process/local level process that are unique or characteristic of the event and that the assessment team believes require special attention in the future.

Part 5: Important References

Document the key references to provide evidence of the validity and verifiability of the assessment. This will also help to ensure that all those involved in the assessment are working from information that has been verified and is robust.

Reference 1: National End-to-End Tsunami Warning Chain



[Replace this generic template by the respective national warning chain graphic]

Reference 2: NTWC timeline with sequence of warning messages

	Warning 1	Warning 2	Warning 4
Timeline	23:53:59 WIB EQ + 06.02 min	00:02:41 WIB EQ + 14.44 min	02:26:21 WIB EQ + 02h 38 min
Magnitude	7.3 SR	6.9 SR	6.9 SR
District	**Warning Level**		
Cilacap	Warning (Siaga)	Warning	Threat over
Tasikmalaya	Warning	Warning	
Bantul	Advisory (Waspada)	No threat	
Kulon Progo	Advisory	Advisory	
Cianjur	Advisory	No threat	
Garut	Advisory	Advisory	
Sukabumi	Advisory	No threat	
Cilacap	Advisory	Advisory	
Kebumen	Advisory	Advisory	

Example

[Replace with actual timeline based on information by NTWC]

Reference 3: Full text warning messages

[For the entire sequence of warning messages - Input by NTWC]

Reference 4: Information used and methodological approach

- ✓ Sources of information, reports, news (with links)
- ✓ Information on the methodology applied of the assessment

Reference 5: Indicators for colour coding

A. Capacity Assessment

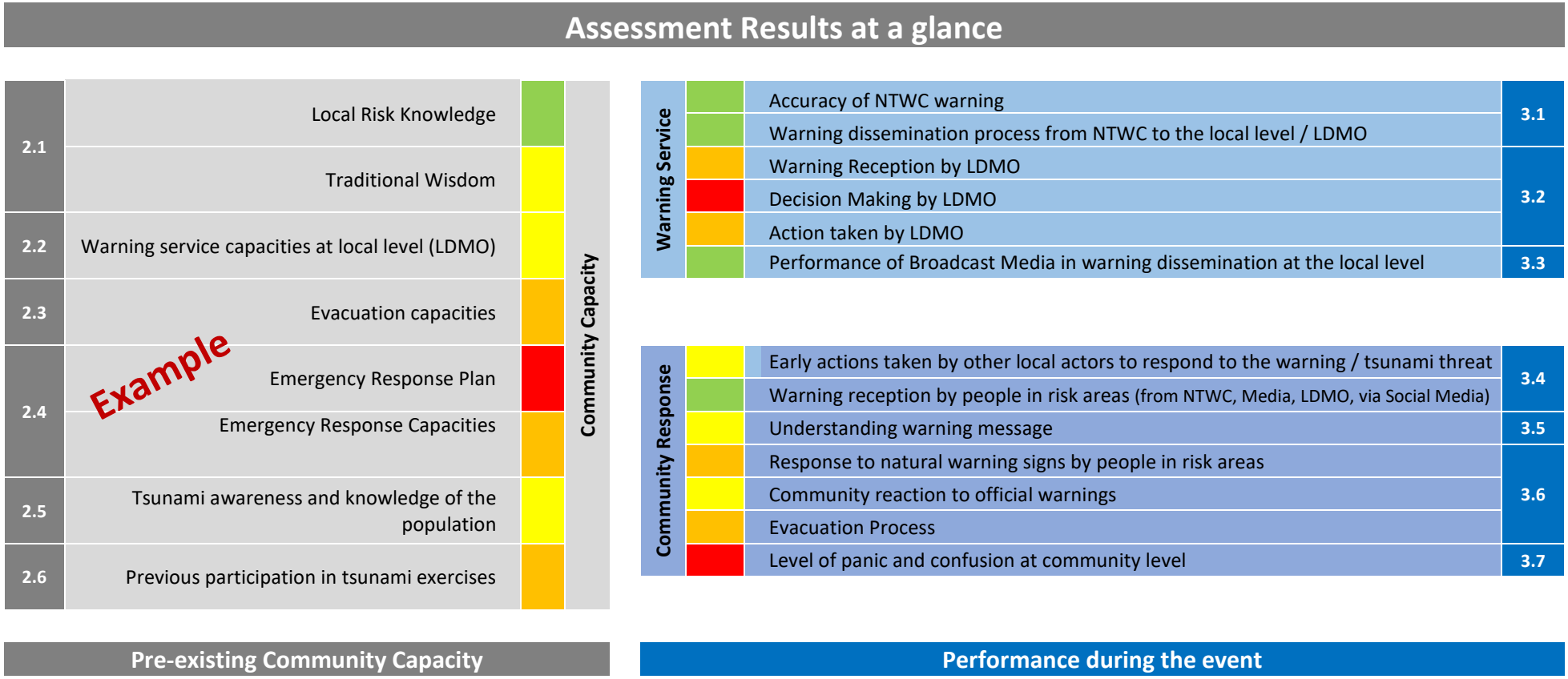
Aspect		Indicator			
2.1	Local Risk Knowledge	Hazard and risk information / maps available and officially approved	Partly available or not yet officially approved	Available but problematic (not adequate scale or quality, several different maps)	No hazard or risk maps available
	Traditional wisdom	Widely known and helped people to react properly	Partially known and helped some people to react properly	Known, but did not fit for this particular event	Known, but let to inappropriate behaviour in the specific situation
2.2	Warning service capacities at local level (LDMO)	Institutional arrangements, SOPs and technical means in place and fully functional 24/7	Institutional arrangements, SOPs and technical means with problems but functional 24/7	Only limited local warning service capacities available (i.e. not 24/7, insufficient staff, lack of SOPs)	No local warning service capacities available
2.3	Evacuation capacities	Solid local evacuation plan available, approved and widely known, signage in place	Local evacuation plan available but not well known by people in risk areas	Local evacuation strategy not adequate (in regards of the threat, time line, for areas that are difficult to evacuate)	No evacuation plan available
2.4	Emergency response plan	Officially approved tsunami emergency plan known by the relevant stakeholder	Officially approved tsunami emergency plan in place but	Local emergency plan insufficient to respond to a tsunami emergency	No emergency response plan available
	Emergency response capacities	Appropriate capacity to manage emergency response operation during a tsunami in place	Only limited capacity for emergency response operation available	Operative capacity insufficient to respond to a tsunami emergency	No operational capacities available
2.5	Tsunami awareness and knowledge of the population	Good knowledge of natural warning signs, local timeline, affected areas and behaviour	Aware about a possible tsunami threat and understanding natural warning signs	Aware about a possible tsunami threat but not knowing further details	No awareness or incorrect knowledge about a local tsunami threat
	Previous participation in tsunami exercises	Community wide exercises are held regularly	At least one community wide exercise has been implemented in the past	At least one exercise has been implemented at institutional level (e.g. school, hospital)	No exercise has been implemented yet

B. Performance Assessment

Aspect		Indicator			
3.1	Accuracy of NTWC warning	Good match (e.g. tsunami predicted and occurred)	Poor match (e.g. orange or red warning level but no tsunami occurred)	Problematic (e.g. conflicting information, warning lifted too early)	False (e.g. warning erroneously issued, erroneous contents)
	Warning dissemination process from NTWC to the local level / LDMO	Complete and on time	Delayed or incomplete	Too late or technical failures of dissemination tools (e.g. WRS)	Not disseminated at all
3.2	Warning Reception by LDMO	Full sequence of long warning messages received on time	Only partly (e.g. only short messages, not full sequence, delays)	Problematic (e.g. technical problems, difficulties in understanding message contents)	No reception (e.g. no staff on duty, not 24/7, failure of technical facilities)
	Decision Making by LDMO	Timely and adequate decision	Delayed or no clear decision	Too late or not adequate	No decision taken
	Action taken by LDMO	Timely and adequate action to provide guidance to community	Delayed action or not providing clear guidance to community	Too late or not adequate action	No action or wrong action taken
3.3	Performance of Broadcast Media in warning dissemination at the local level	Played a significant role and timely	Played a minor role or delayed	Problematic (e.g. false or conflicting information, too late)	No broadcast media action on NTWC tsunami warning
3.4	Early actions taken by other local actors to respond to the warning / tsunami threat	Timely and adequate action to provide guidance to community	Delayed action or not providing clear guidance to community	Too late or not adequate action	No action or wrong action taken
3.5	Warning reception by people in risk areas (from NTWC, Media, LDMO, via Social Media)	Majority of people received timely warnings from a reliable source	Only a minority of people received warnings from a reliable source on time	Problematic (warnings received late, technical problems due to power loss network failure)	No warnings received at all
	Understanding warning message	Well understood	Some difficulties in understanding message contents	Major difficulties in understanding message contents	Confusion or wrong action taken due to misinterpretation
3.6	Response to natural warning signs by people in risk areas	Quick and adequate reaction by most people	Delayed reaction by majority of people	Very late or not adequate reaction by majority of people	Natural warning signs ignored
	Community reaction to official warnings	Adequate and timely	Delayed reaction by majority of people	Very late or not adequate reaction by majority of people	No reaction
	Evacuation Process	Without major problems, people used all available options (horizontal and vertical)	Rather unorganized evacuation process	Massive traffic congestion and accidents	Massive evacuation problems leading to casualties
3.7	Level of panic and confusion at community level	No	Minor	High, but without serious consequences	High, with serious consecuences

Part 6: Overall Result Chart (shown here with an example of colouring for a hypothetical case)

We recommend presenting the results in an overall result chart that provides a quick overview of the main findings via colour codes and thus also enables a comparison between different cases that have been investigated over time.



[This chart is editable. Please replace rating colours in accordance with actual assessment results]