

Tackling consequences of extreme rainfalls and Flash Floods

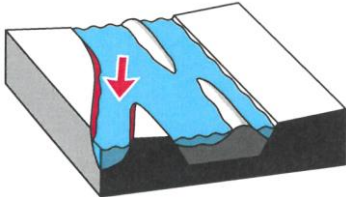


TaFF related terminology

The following glossary gives an overview about some terms which are related with the TaFF- projects thematic and explains them. In order to get a better understanding some of the terms were additionally illustrated with pictures.

Glossary of TaFF terminology

Table 1: TaFF terms in alphabetical order

Term	Explanation	Picture if necessary
Bottom Load	Debris in the waterway, which is negatively buoyant. This creates a hidden danger below the surface. (1)	
Boulders	Boulders are small rocks, sand and pebbles which are transported by water. (2)	-
Break Out	Because of deadlocks, spreadings or landings, the water erupts from the flow channel at one point and makes a new way out of the riverbed. (3)	 <p>Figure 1: Break Out pattern(3)</p>
Capillary water	Capillary water is able to climb upwards the different soil layers against gravity. This type of water is also able to infiltrate into the wall of buildings. (4)	-
Century rain	An extreme event lasting about five minutes, which occurs once every one hundred years, is described as a century rain. This value is mainly used for the design of drainage systems. Rainfall events can be quite different from region to region. Statistically, the average is about 0,1L/sm ² . (5)	-
Climate Change	Climate change refers to a broad range of global phenomena created predominantly by burning fossil fuels, which add heat-trapping gases to Earth's atmosphere. These phenomena include the increased temperature trends described by global warming, but also encompass changes such as sea level rise; ice mass loss in Greenland, Antarctica, the Arctic and mountain glaciers worldwide; shifts in flower/plant blooming; and extreme weather events. (6)	-
Coping Capacity	The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions,	-


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	emergencies or disasters. (7)	
Damage potential	Upper limit value of the possible damage as a basis for the assessment of expected damage as a function of the event characteristics, such as intensity, duration, spatial extent etc.. In this respect, the maximum damage potential represents the greatest possible damage under the worst conceivable but still realistic conditions. (8)	-
Deadlock	Closure of the flow channel at natural or artificial bottlenecks by driftwood and debris freight. The consequences can be breakouts of the water, the breaking of the deadlock and flooding. (3)	<p>Figure 2: Deadlock pattern (3)</p>
Debris Cone	Depositing of rubble, stone or earth material. As a result of a debris deposit, it is deposited along the crest line of the debris cone. Therefore, the slope angle of the debris cone generally decreases along the crest line. (9)	-
Debris Flow	A great deal of debris freight is generated by processes such as erosion, clogging or sole liquefaction. This can lead to the development of a "water debris freight avalanche". Characteristic features are the high solids content and a high flow velocity. Debris flows often occur in waves. (3)	<p>Figure 3: Debris flow pattern (3)</p>
Drain Channel	A Drain Channel is a Straight-line component combination that receives surface water over its entire length and transfers it to a drain. A Drain Channel is a Straight-line component combination that receives surface water over its entire length and transfers it to a drain. (10)	<p>Figure 4: Examples for Drain Channels (4)</p>
Drainage Ditch	A drainage ditch is an emergency waterway in case of heavy rainfall. Due to the surface inclination of the soil, the precipitation water collects in a ditch and is thus discharged. (4)	<p>Figure 5: Function of a Drainage Ditch (4)</p>

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		 <p>Figure 6: Drainage Ditch in a garden (4)</p>
Eddy	Horizontal reversal of water flow where the differential between the current's pressure on the upstream and downstream sides of an obstacle in a channel causes the water behind the obstacle to flow upstream. Serves as an excellent area to rest or scout. (1)	
Erosion	Erosions are processes that lead to an extensive flushing or linear flushing of soil particles. (11)	-
Flash Flood	Flash Floods are often characterized by deep, fast flowing water. The risk to people and property is increased by the short time available to respond. So Flash Floods are one of the most devastating natural hazards. The main cause is usually Heavy Rainfall. However there are also infrastructure-related floodings which occur due to dam breaks, surface water flooding in urban areas or the failure of other structures. (12)	-
Flood	A flood occurs often after heavy rainfalls or dam-breaks. Other possible triggers are: melting snow, sea surge, urban sewer or storms. Because of those triggers the amount of water in rivers and lakes rises, passes through its borders and overflows streets and buildings. (13)	-
Flood hazard maps/Flood risk maps	<p>Maps which are to be drawn up in Germany by the responsible authorities and which are to be used for risk assessment in the event of a flood. The areas to be covered are those which...</p> <ol style="list-style-type: none"> 1. ...be flooded during a flood with a return interval of 200 years or during an extreme event. 2. ...be flooded during a flood with a recurrence interval of 100 years. 3. ...are more likely to be flooded in the event of a flood. <p>In addition, information on the extent of flooding, water depth, flow velocities, possible runoff and negative consequences must be included. (Gesetz zur Ordnung des Wasserhaushalts [Wasserhaushaltsgesetz - WHG] vom 31. Juli 2009 [BGBl. I S. 2585] / German Water Resources Act – [WHG] from 31.</p>	-

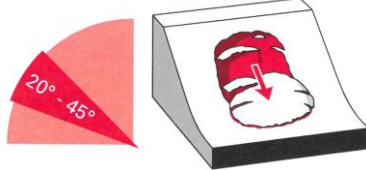
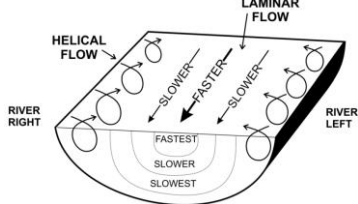
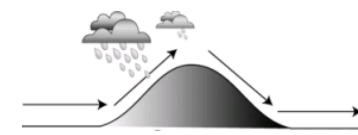
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	of July 2009[published in BGBl. S. 2585])	
Flood Wave	Occurs normally because of a dam-break scenario and can be powerful. (13)	-
Fluvial Processes	"Fluvial" is latin and translated as "river". This means it contains all processes, which are related to water or flowing movements. (2)	-
Global Warming	Global warming refers to the long-term warming of the planet since the early 20th century, and most notably since the late 1970s, due to the increase in fossil fuel emissions since the Industrial Revolution. (6)	-
Gravitational Mass Movements	Mass movements include a relocation of earthmaterial down the slope because of the effect of gravity. The speed depends on the type of mass moving downhill. There are five types of movement: sliding, flowing, falling, drifting and tipping. Those movements are often triggered by heavy rains. (2)	-
Gully	Gullies built access into the sewer system and act as discharge channel for water within surface sealed areas. (4)	-
Hazard	A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (7)	-
Heavy Rainfall	Heavy Rainfall occurs within short periods as a result of very unstable air with a high humidity. After an extreme rainfall event landslides and flash floods can appear. Rain is called "heavy rain", when the precipitation is 20mm per hour or more. (14)	-
Infrastructure	An infrastructure provides a fundamentally necessary service for a society or a system. It can be material, institutional or personnel structures and facilities. Infrastructures are characterized by their features. They are often locally bound, indivisible and usually have a long service life. Interdependencies also occur between the individual sub-areas. (15)	-
Landings	With decreasing flow velocity, the entrained debris load is deposited in the flow channel. As a result, the water level rises significantly. (3)	<p>Figure 7: Landings pattern(3)</p>

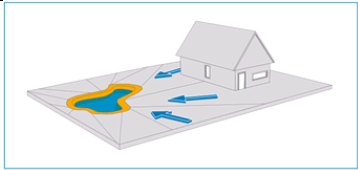
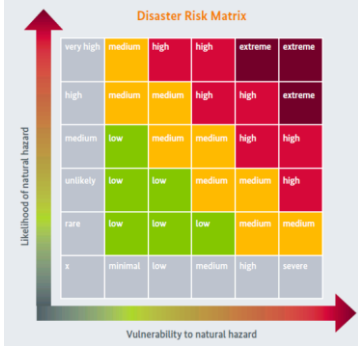
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<p>Landslide</p>	<p>Landslides are sliding processes of different kinds. There are mass shifts in the subsurface. This can be seen, among other things, in soil fractures. These mass movements can be of very long (hours, days, years) or very short (seconds, minutes) duration. Landslides mainly occur on slopes with an inclination of 20°-40°. (3; 16)</p>	 <p>Figure 8: Landslide pattern (3)</p>
<p>Laminar Flow</p>	<p>Layered downstream flow of the river's main current. The layer in the center just below the surface moves the fastest, while the side and bottom layers are slowed somewhat by friction. (1)</p>	 <p>Figure 9: Laminar Flow pattern of a river(1)</p>
<p>Mitigation</p>	<p>The lessening or limitation of the adverse impacts of hazards and related disasters. (7)</p>	<p>-</p>
<p>Mudflow</p>	<p>Mudflow is a very popular term and often used in news media, but there is no technical definition. It is also common to use the word "Mudslide", but mud is not sliding, it is flowing, so this term is misleading and should not be used. The term mudflow is used by news media and the public to describe flows like debris flow, lahar, avalanche, earth flow or mudslide and covers all types of flows. It is a process including gravel, boulders and rocks mixed with water moving downhill. Mudflows are caused by volcanic activity, heavy rainfalls, landslides, earthquakes, snow and ice melt, underground water or break of dams. (17; 18)</p>	<p>-</p>
<p>Orography</p>	<p>Orography deals with the pure surface form of the terrain. The surface structures, such as mountains, can have a decisive influence on the local weather. Thus -vertical up- and downdrafts arise at mountains. This is accompanied by weather conditions such as ascending precipitation and winds blowing. (19; 20)</p>	 <p>Figure 10: Winds and precipitation produced by orography (19)</p>
<p>Percolating Water</p>	<p>Percolating water is defined as water gathering in different soil layers. It is possible that the water infiltrates into the wall of buildings and causes damages. (4)</p>	<p>-</p>
<p>Residual Risk</p>	<p>The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained. (7)</p>	<p>-</p>
<p>Resilience</p>	<p>The ability of a system, community or society exposed to hazards to resist, absorb,</p>	<p>-</p>

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	accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. In a concrete human context, this includes the ability to learn from past catastrophic events by developing organisational or constructional strategies to become more resistant to future events. (7; 21; 22)	
Retention Basin	A retention basin is used to manage big amounts of water occurring because of a storm or heavy rainfalls. It can look like an artificial lake or a hollow, where the water stays until it percolates through the soil until it reaches the groundwater. (4)	 <p>Figure 11: Function of a Retention Basin (4)</p>
Risk	The combination of probability of occurrence and extent of damage of a certain event. (7)	-
Risk Assessment Matrix	A risk assessment matrix is the visualized product of a risk assessment. The risk is presented as a correlation between the likelihood of occurrence and the extent of damage to an event. These two factors are assessed either subjectively or on the basis of predetermined factors. (23; 24)	 <p>Figure 12: Example for Disaster Risk Matrix for a natural hazard (25)</p>
Risk Management	The systematic approach and practice of managing uncertainty to minimize potential harm and loss. (7)	-
River Terms	Headwaters:	The beginning of a river is called its headwaters. Even if a river becomes big and powerful, its headwaters often don't start out that way. Some headwaters are springs that come from under the ground. Others are marshy areas fed by mountain snow. A river's headwaters can be huge, with thousands of small streams that flow together, or just a trickle from a lake or pond. (26)
	Tributary:	A tributary is a river that feeds into another river, rather than ending in a lake, pond, or ocean. (26)

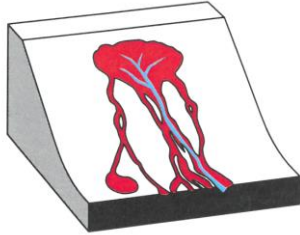
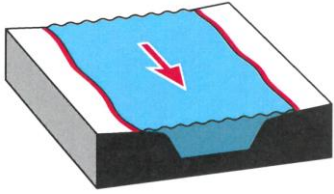
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	Up and Down, Left and Right:	Downstream always points to the end of a river. “Upstream” always points to the river’s source. As you look downstream, your right hand corresponds to “River Right”. Your left hand corresponds to “River Left.” (26)	
	River Channel:	The shape of a river channel depends on how much water has been flowing in it for how long, over what kinds of soil or rock, and through what vegetation. There are many different kinds of river channels – some are wide and constantly changing, some crisscross like a braid, and others stay in one main channel between steep banks. (26)	-
	River Bank:	The land next to the river is called the riverbank. These areas also provide valuable services like protection from erosion during floods. (26)	
	Mouth or Delta:	The end of a river is its mouth, or delta. At a river’s delta, the land flattens out and the water loses speed, spreading into a fan shape. Usually this happens when the river meets an ocean, lake, or wetland. (26)	
Runoff Management		Run-off pathway management techniques can delay and flatten the hydrograph and reduce peak flow locally for small flood events by intercepting, slowing and filtering surface water runoff. They usually work best as a cluster of features working as a network throughout the landscape. (27)	-
Sewer		Sewers are part of a big system. They are often placed underground. They transport water or sewage, often from buildings to treatment facilities. (4)	-
Sewer Backflow		Heavy rains often cause a disfunction of the sewer system. There is too much water flowing into the gullies, in which case the water within the pipes flows back into the building as long as there is no safety construction. This safety construction can be a backwater valve. It prevents the water from flowing back and flooding the building. (4)	-

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<p>Slope Debris Flow</p>	<p>Mixture of rock, water and earth mass, which flows downhill in a pulpy form. The flow velocities are high and in contrast to the normal debris flow, this type of debris flow occurs in a slope and not in the stream bed. Slope debris flows have a great destructive power and can spread far into flat areas. (3)</p>	 <p>Figure 13: Slope Debris Flow pattern (3)</p>
<p>Soil and Land Management</p>	<p>Soil and land management techniques can reduce peak flow by slowing and storing surface water runoff and encouraging infiltration with the soil. (27)</p>	<p>-</p>
<p>Spreading</p>	<p>If a body of water carries more water than the stream channel is able to hold, the body of water will overflow its banks. (3)</p>	 <p>Figure 14: Spreading pattern (3)</p>
<p>Surface Sealing</p>	<p>Surface sealing means that it is impossible for water to infiltrate into the ground. This occurs often in cities because of the building development. (4)</p>	<p>-</p>
<p>Susceptibility</p>	<p>Susceptibility generally refers to the likelihood of harm, loss and disruption in an extreme event triggered by a natural hazard. Thus susceptibility describes structural characteristics and framework conditions of a society. (28)</p>	<p>-</p>
<p>Torrent</p>	<p>Torrents are similar to flash floods. They are normally placed in mountain regions and set in a stream. In case of a flood, caused by heavy rainfalls, a huge amount of water is flowing downhill and the sediment transport rate and the speed of transportation rises. A transportation of gravel is also possible. The torrent sometimes changes its flow course (crosses its streambed) and can get dangerous for humans. (29)</p>	<p>-</p>
<p>Vademecum</p>	<p>The Vademecum gives a general overview of the measures taken by EU Member States as well as at EU level to deal with disasters. Disasters may be due to natural causes, such as earthquakes, landslides, forest fires, floods, snowstorms, tidal waves and/or human activity, such as in the case of accidents involving chemicals, etc.</p> <p>The Vademecum is a source of information for:</p>	<p>-</p>

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	<ul style="list-style-type: none"> - professionals working in the field of civil protection at the national, regional and local level - volunteers and non-governmental organisations - interested members of the public <p>Link: http://ec.europa.eu/echo/files/civil_protection/vademecum/index.html (30)</p>	
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (7)	-
Water Catchment Area	The area measured in the horizontal projection delimited by an above-ground or underground watershed whose water flows to a certain location. In general, the underground watershed is unknown, for this reason the above-ground catchment area is often determined on the basis of natural occurrences (e.g. contour lines). (31)	<p>Figure 15: Illustration of the aboveground and underground catchment area (33)</p>
Watershed	The watershed is the hydrological boundary of a catchment area. It cannot always be deduced from the topographical conditions. Due to the nature of the soil, underground inflows and outflows can be formed. Anthropogenic influences, such as water pipes and drainage systems, must also be taken into considerations. (32)	-
Weather Front	A weather front is defined as a narrow boundary zone between air masses of different temperature, humidity and other properties. In this front area there may can be sudden changes in air pressure or temperature. Wind convergenz can also occur because of friction. All these factors lead to characteristic changes in cloud formation and weather conditions. (33)	<p>Figure 16: Map with different Weather Fronts (34)</p>
Weather Warnings	Weather warnings are official forecasts of weather phenomena that can lead to a danger to public safety and order. Warnings are always generated on an event-driven basis and distributed in many ways, e.g. via the Internet. These weather warnings are categorized in different levels. (34)	-
Weather Warning Levels	<p>The individual weather warning levels are listed below:</p> <p>-Weather warnings are level 1 warnings:</p>	-

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	<p>These are warnings that prompt recipients to be aware of something coming.</p> <p>-Warnings of prominent weather are level 2 warnings: These are warnings that ask the recipient to "Be prepared" - be prepared for something to come, take precautions in case it comes badly.</p> <p>-A weather warning is a level 3 warning: These are warnings that prompt recipients to "take action" - "do something, protect yourself". The predicted event makes protection measures necessary, e.g. going to the security of a house.</p> <p>-Warnings of extreme storms are level 4 warnings: These are the highest level warnings and require the recipient to take urgent and immediate action to get to safety and protect their property. (34)</p>	
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