

**Short Communication***Copyright © All rights are reserved by Peter Domonkos*

# How to Reduce Flood Impacts

**Peter Domonkos\***

43500 Tortosa, Spain

**Corresponding author:** Peter Domonkos, 43500 Tortosa, Spain.**Received Date:** January 25, 2025**Published Date:** February 07, 2025**Keywords:** Flood protection, Flood alarming, Climate change**Introduction**

Devastating floods sometimes occur. Humans had to combat against flood impacts in all their history, and we must also tackle such floods of the present and future eras. Indeed, the flood risk is generally increasing for the ongoing global warming. Warmer air may hold higher amount of water vapor, and some recent highly devastating flood events show direct relations to record breaking precipitation amounts for the changing climate. In this respect the outlooks to the rest of this century are unfavorable, since the atmospheric greenhouse gas concentration still grows fast, and observed air temperatures show substantial warming trend worldwide [1]. In addition, growing urbanization in river banks speeds up the runoff of the water coming from heavy precipitation events [2], since dykes and concrete surfaces impede the natural infiltration to the deeper ground layers.

In Western Europe, two recent flood disasters have caused high death tolls and enormous economical losses. In July 2021 a large area was flooded along the Rhine and its tributaries, causing about 33 billion EUR economic loss [3,4]. The number of mortal victims was 189 in Germany, and dozens of further victims were reported from the neighbouring countries. In October 2024 a similarly disastrous flood occurred in Valencia region of Spain [5]. This flood caused at least 232 deaths and the economic loss was again above

30 billion EUR. In both flood events the fallen precipitation amounts and water levels exceeded earlier recorded historical maximums.

**General Aspects of Flood Protection**

There are various ways to prevent flood events or at least attenuate their impacts, and they have widely been applied in the recent centuries: protection of settlements with dykes; constructions and control of dams and reservoirs; leaving areas less valuables to be flooded; maintenance and cleaning of canalization; regular control of hydrographic properties which might change in time both for natural processes and human interventions. On the other hand, the application of stricter rules in urban planning could significantly reduce flood losses: roads and buildings for permanent use should not be placed into floodable areas [6].

As global warming causes events of increased water discharge and water levels, the mitigation of climate change is desirable. The effective mitigation of climate change is a serious and so far unresolved problem of the human society, yet this paper skips its detailed discussion.

**Saving Human Lives**

When dykes do not protect against flooding, we can do little

to save bridges, roads and buildings of floodable areas. However, deaths for floods could be prevented by the use of appropriate alarming and information services. Due to the operation of meteorological radars, the amount of falling precipitation is known just before the moment it touches the ground, so that there is a time span between the detection of the water amount and the production of floods from that. The length of the time span varies widely according to geographical characteristics, but in any case, it is sufficient to submit alarming messages to the people in danger. An improved level of watching and information service must be operated when the weather situation indicates its necessity, and units for the execution of possible evacuations must be on stand-by [7]. All these are known for several decades, so that it might seem to be an anachronism that in the era of meteorological radars, internet and mobile phones, hundreds of people die for floods in some developed and democratic countries of Western Europe. What were failed there?

A survey after the flood event along the Rhine showed that the majority of residents were known about the flood risk, but the information that they received was insufficient [8], and thus they did not think of escaping from floodable areas. In case of the flood in Valencia, many residents did not know anything about the approaching disaster. In some flooded villages the weather was dry, so that people did not worry at all about floods, and several of them were surprised in basements or underground garages without any chance to escape [5]. The chronic of the flood in Valencia also indicates some indecision or in consequence in the management of flood protection. The lessons of these tragic events can be summarized as follows:

- Flood protection in general should be treated with the same strictness as fire protection.
- Floodable areas should be mapped, and the maps should be revisited periodically in every 5-10 years.
- In the development of urban planning, growing flood dangers for climate change should be considered.
- Site specific protocols of flood protection should be elaborated and revisited periodically. Such protocols should contain the plan of actions for various danger levels. While the elaboration of protocols is an interdisciplinary work, the determination of danger level is the responsibility of expert hydrologists. The alarming of people in danger is a part of the protocols.
- People living or working in floodable areas should be educated about the possibility of flood dangers, the operation

of flood alarming and the site-specific options to escape in case of emergency.

Flooding water levels cannot be predicted with high accuracy, and thus flood alarms should be emitted with higher frequency and for wider areas than which are justified by truly occurred flood events. A certain level of over-alarming is unavoidable for security reasons, even if it might generate criticism and lack of the understanding among citizens. This is the point why a flood protection system would operate with higher security when hydrologists and not politicians decide about danger levels and the application of the previously elaborated flood protection protocol relevant to a given danger level.

## Conclusion

Climate change elevates flood risks in many parts of the world. Actually, we can do little to stop global warming, but we should be better prepared to save people from devastating floods.

## Acknowledgement

None.

## Conflicts of Interests

None.

## References

1. Intergovernmental Panel on Climate Change (2021) The Physical Science Basis. Working Group I contribution to the IPCC Sixth Assessment Report.
2. Feng B, Zhang Y, Bourke R (2021) Urbanization impacts on flood risks based on urban growth data and coupled flood models. *Nat Hazards* 106: 613-627.
3. <https://www.fathom.global/event-response/the-german-flash-floods-2021/>
4. <https://climate.axa/publications/2021-european-summer-floods-a-warning-about-the-climate-induced-increase-in-flood-risk/>
5. [https://en.wikipedia.org/wiki/2024\\_Spanish\\_floods](https://en.wikipedia.org/wiki/2024_Spanish_floods)
6. Meng M, Dąbrowski M, Xiong L, Stead D (2022) Spatial planning in the face of flood risk: Between inertia and transition. *Cities* 126: 103702
7. Hallegatte S (2012) A Cost Effective Solution to Reduce Disaster Losses in Developing Countries: Hydro-Meteorological Services, Early Warning, and Evacuation. Policy Research Working Paper 6058, World Bank, Washington, DC, pp. 20.
8. Thielen AH, Bubeck P, Heidenreich A, Von Keyserlingk J, Dillenaar L, et al. (2023) Performance of the flood warning system in Germany in July 2021 – insights from affected residents. *Nat Hazards Earth Syst Sci* 23(2): 973-990.