

The Necessity to Initiate and Develop Common Directions in the Assessment and Management of Flood Risks at European Community Level¹

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Abstract

Floods are natural phenomena and an element of Earth's natural hydrological cycle; they have always existed and will continue to exist. From this point of view, flood risk assessment and management is essential. Floods cannot be avoided, but can be managed, and their effects can be reduced by a systematic process of measures and actions meant to diminish the risks associated with this phenomenon. Floods do not know national frontiers, thus the common actions of member states are called for, and the principle of solidarity must play a fundamental role. The initiatives of European officials concretized in Directive 2007/60 regarding flood risk assessment and management. The Directive will be implemented in member states in three stages: a) preliminary flood risk assessment; b) flood hazard mapping and flood risk mapping; c) establishment of flood risk management plans. The target of Directive 2007/60 is the setting of a framework for flood risk assessment and management with a view to reduce negative consequences for human health, environment, cultural heritage, and economic activity.

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¹ Some clarifications about the title of the paper will be in order: 1. I used the term "directions" and not "policy" so as not to suggest that we are dealing with a new kind of policy, distinct from environmental one; 2. Having in mind that environmental policy is part of the first pillar of the European Union, we used the expression "flood risk assessment and management on European Community level" and not on European Union level. We speak about the European Union when referring to all three pillars, and not just one.

Human existence also means one's exposure to a series of risks. The extreme manifestations of natural phenomena such as storms, floods, drought, landslides, strong earthquakes, and the likes, with technological accidents (serious pollution, for instance) and conflicting situations added up, may have a direct influence on the life of any individual and the society as a whole.¹ It is the precise knowledge of these phenomena termed as calamities and/or disasters that is required in order to find the best solutions for alleviating their effects and reconstructing the affected areas. The effort to diminish the effects of these disasters implies the interdisciplinary study of disasters, vulnerability and risk,^{2,3} as well as the information and education of the population. The World Health Organization defines disaster as any event which causes considerable harm, ecological destructions, human life loss, and the damage of health and health services to such an extent as to justify extraordinary reaction or implication from outside the affected community. "Hazard is a threatening event which represents the probability of the occurrence, within a certain time limit, of a phenomenon potentially damaging for humans, goods, and the environment..."⁴ Hazard is thus a natural or anthropogenic phenomenon, harmful to man, the consequences of which are due to the transgression of security norms imposed by every society. Natural hazards are a form of interaction between man and the environment, during which certain adaptation limits of the society are exceeded. The presence of human society is a requisite for their occurrence. Vulnerability emphasizes how exposed humans and their goods are to various hazards, and indicates the level of damages that a certain phenomenon may produce. The risk is defined as the probability

¹ For details, see Ruxandra-Mălina Petrescu-Mag, *Politici, instituții și legislație pentru mediu* (Environmental policies, institutions and legislation) (Cluj-Napoca: AcademicPres, 2008), 107.

² See also Florin Stănculescu, *Sistem complex pentru managementul mediului bazat pe simulare* (Complex system for simulation-based environmental management) (2002), www.ici.ro/ici/revista/ria2002_1/art1.htm

³ Victor Sorocovschi (ed.), *Riscuri și catastrofe* (Risks and disasters) (Cluj-Napoca: Casa Cărții de Știință, 2002), 22: "the concepts of hazard and risk, as well as associated notions, raise serious difficulties as regards the definition of content and implications. These difficulties derive from the basic inadequacy of the traditional semantic sense and present-day scientific meanings... certain meanings are already established ... due to the pejorative use of the terms for their seduction capacity, which lends them a superior media impact".

⁴ Dan Bălțeanu and Alexe Rădița, *Hazarde naturale și antropogene* (Natural and anthropogenic hazards) (Bucharest: Corint, 2001), 3.

of the exposure of humans and goods created by them to the action of a certain hazard of variable degree. The risk means the expectable level of human life loss, number of casualties, damage of property and economic activity caused by one particular, or a group of, natural phenomena at a certain place and within a certain time limit. The elements of risk refer to the populations, property, communication channels, economic activities, etc. exposed to risk within a certain area.¹

Some of the most disastrous extreme phenomena are floods. By their proportions, floods do not only produce material damage, human life loss, and evacuations, but also environmental damage (surface water pollution by washing wastes off the riverbanks into the river bed, by decomposing drowned animals, breaking transportation pipes for oil products, etc.; underground water pollution, soil pollution).² Human activities (such as the increasing number of human settlements and economic goods situated in flood areas, as well as the reduction of natural water retention capacity due to soil exploitation) and climatic changes equally have a role to play in the increasing probability of floods and their negative impact. The occurrence of floods is primarily due to natural factors; however, anthropic factors cannot be neglected either: deforestation, agricultural works, deliberate break of dams³ and embankments, hydro-technical works constructed without the exact knowledge of the probability of maximum levels and flow capacity, etc.

Floods are natural phenomena and an element of Earth's natural hydrological cycle; they have always existed and will continue to exist. From this point of view, flood risk assessment⁴ and management is

¹ Jorge Olcina Cantos, *Riesgos naturales? Sequias e inundaciones*, (Davinci Continental, 2006), 24: Natural risk – the probability that a social group is affected by an extreme natural phenomenon about to develop in the geographical area of that particular community; Catastrophes – the negative effects of an extreme natural occurrence over a certain community; Disasters – the highest level of a catastrophe which imposes external aid to the affected territory.

² On the impact on population and the environment, see Florina Grecu, *Hazarde și riscuri naturale* (Natural hazards and risks) (Bucharest: Editura Universitară, 2006), 180-184.

³ Florina Grecu, *Hazarde și riscuri*, 179-180. This work offers some examples of such events. For instance, the Dneproges dam on Dnieper River, of a 3 billion m³ volume and a 162 km long lake was destroyed in the Second World War by the Russian army in retreat (so that the advancing Germans could not use the energy produced). The flood flow with a capacity of 35,000 m³/s inundated large surfaces of land, but the population was warned in advance.

⁴ Risk assessment means the identification, assessment, and interpretation of risk

essential. Floods cannot be avoided, but can be managed, and their effects can be reduced by a systematic process of measures and actions meant to diminish the hazard associated with this phenomenon. Floods do not know national frontiers, thus the common actions of member states are called for, and the principle of solidarity must play a fundamental role. In light of this principle, member states should be encouraged to find a balanced division of their responsibilities, and commonly agree on the measures to take for their common benefit in managing flood risk all along water flows. In drawing up the policies regarding water and the exploitation of lands, member states and the Community should take into account the impact that these policies could have on flood risks and their management. There is a need of a holistic approach to the phenomenon of floods at the level of hydrographic basins by promoting a coordinated development and integrated management of activities regarding waters, lands, and neighbouring territories: transport, urban development, and nature preservation. Flood management is an intersecting, multidisciplinary activity, comprising water resource management, land arrangement and urban development, natural preservation, agricultural and forestry development, individual protection, etc., each sector being responsible for the undertaking of specific actions. There are various types of floods on the territory of the Community, such as river floods, torrential floods, urban floods, and seashore floods. The damages caused by floods may vary from one country or region to another. As a result, the objectives of flood risk management should be established by the member states themselves, and should be based upon local and regional circumstances. As previously mentioned, the causes and consequences of floods vary according to the countries and regions of the Community. Therefore the flood risk management plans must take into consideration the characteristics of the regions they cover and prescribe solutions adapted to the needs and priorities of those areas, also securing the relevant coordination of hydrographic districts and promoting the achievement of environmental objectives as directed by community legislation. Flood risk management¹ means the application of certain policies, procedures, and practices of risk identification, analysis and assessment, treatment, monitoring and

perception and its comparison with the social risk accepted for the orientation of decisions and actions in the risk management process.

¹ On flood – costs – water management relationship, see: Jan Jaap Bouma et al, “Risk assessment and water management” in *Environmental Modelling & Software*, Elsevier, 20 (2005): 141-151. (www.elsevier.com/locate/envsoft).

reassessment of risks for reducing them to the level in which human communities may satisfy their needs and ambitions in a physically and socially durable environment. The main activities of flood management comprise: 1) prevention activities – prevention, protection, and preparation; 2) operative management activities, undertaken during flooding; 3) activities undertaken after the flood. A famous article¹ had a decisive contribution to understanding the fact that the ignorance of the risk is the highest risk of all, and that risk management is an economically and socially beneficial solution.

Europe suffered over 100 great floods in the time period between 1998 and 2002, including, among others, those on the Danube and the Elba in 2002.² The floods in the period of 2005-2007 emphasized the weakness of both the techniques used in flood protection, and the response capacity of flood management. Floods in Europe have caused over 700 deaths since 1998, have determined the migration of over half a million people, and material damages of over 25 billion Euros. Under these circumstances, the European Commission has underlined the importance of a legal framework for flood risk prevention and management. European officials' harmonization efforts have taken shape in Directive³ 2007/60 regarding flood risk assessment and management.⁴ This new Directive completes the Community's legal framework on water policy. Directive 2000/60/CE⁵ (regarding the establishment of water policy on Community level) imposes the creation of management

¹ Aaron Wildavsky, "No Risk Is the Highest Risk of All", *American Scientist* Volume 67, Issue 1, p.32-37 Quoted in: Ștefan Ionescu, *Riscul nostru cel de toate zilele. Inundații și cutremure* (Our everyday risks. Floods and earthquakes) (Bucharest: Matrix Rom, 2006), 18.

² For details, see Thomas Dworak and Benjamin Görlac, "Flood Risk Management in Europe – the Development of a Common EU Policy", *International Journal of River Basin Management* 2 (2006): 97-103.

³ Directives are acts which establish obligatory objectives for member states, leaving them to elaborate the methods to attain these. The text also establishes the date by which member states must adopt their measures of adaptation to the Directive. Directives are directly applied on member state territories, but only following the transposition deadline.

⁴ Directive 2007/60/EC of the European Parliament and of the Council, 23 October 2007, on the assessment and management of flood risks, Official Journal L 288 , 06/11/2007 p. 0027 – 0034.

⁵ Directive 2000/60/CE of the European Parliament and of the Council, 23 October 2000, establishing a framework for Community action in the field of water policy, Official Journal L 327 , 22/12/2000 p. 0001 – 0073.

plans of hydrographic basins for each hydrographic district in order to reach a good ecological and chemical state which will play a role in the diminution of flood effects. However, the decrease of flood risk is not one of the main objectives of this Directive, and it does not take account of the future modifications of flood risk as a result of climatic changes.

The target of Directive 2007/60 is the setting of a framework for flood risk assessment and management with a view to reduce negative consequences of floods for human health, environment, cultural heritage, and economic activities in the Community. Article 2 defines terms such as “flood”¹ as temporary water covering of a territory which is not regularly covered with water. This includes floods caused by rivers, mountain torrents, Mediterranean-type intermittent water flows, and sea floods in seashore areas; it does not include however floods produced by sewerage systems. “Flood risk” means the combination of the probability of flood occurrence and its potentially damaging effects for human health, environment, cultural heritage, and economic activities.

The new Directive will be transposed to national legislature no later than the middle of year 2009. The Directive will be implemented in member states in three stages: a) preliminary flood risk assessment, to be completed by December 2011; b) hazard mapping and flood risk mapping to be completed by December 2013; c) establishment of flood risk management plans to be completed by December 2015. The Directive describes the technical content of these three stages according to common criteria which will have to improve considerably the management of flood risk situations on European level. European Parliament members requested the Directive to take into account climatic changes, and this will have to be considered in preliminary assessments and in the report to be established by the Commission in 2018 regarding the application of the Directive.

In order to comply with the target established in Article 1, it has been determined that member states draw up a preliminary flood risk assessment for each hydrographic district or management unit on their territory. The preliminary risk assessment is drawn up for furnishing the assessment of potential risks. Assessment will include at least the followings: a) maps of hydrographic basins at adequate scale, including

¹ In 1992, the International Meteorological Organization (now World Meteorological Organization) defined flood as the submersion of a major riverbed in the waters which overflow the banks of a minor riverbed, or the accumulation of precipitation water or snow melting in areas with insufficient natural drainage.

the limits of hydrographic basins, sub-basins, and shore areas where applicable, exposing the topography and land usage; b) description of floods in the past with significant negative effects on human health, environment, cultural heritage, and economic activities, especially for territories with a high probability of the occurrence of similar events; including the size and course of previous floods, as well as the assessment of their negative effects; c) description of significant floods in the past, if their significant negative effects or similar future events could be foreseen; and depending on the specific needs of member states, d) assessment of potential negative effect of future floods for human health, environment, cultural heritage, and economic activity, taking into account as much as possible issues such as topography, position, hydrological and geo-morphological characteristics of water flows, including riverbeds as natural retention areas, the efficiency of defence infrastructure for flood protection, position of populated areas, areas of long-term economic activity and development, including the effects of climate change on flood occurrence.

Member states must complete their preliminary flood risk assessment no later than December 22, 2011.

According to Article 5, on the basis of preliminary risk assessment, member states identify for each hydrographic district or for each management unit the areas which they consider to exhibit a significant flood risk, or where the occurrence of such a risk may be considered probable.

The next article imposes that member states draw up flood hazard maps and flood risk maps on the level of hydrographic district or unit. Hazard maps cover the geographical areas which may be flooded in the following cases: a) low probability of floods, or only in extreme conditions; b) medium probability of floods (probable period of repetition ≥ 100 years); c) high probability of floods. For each of these cases a series of elements are indicated, which must be taken into account: the size of floods, the depth or level of waters, as applicable; the relevant flow speed or capacity. Flood risk maps must indicate the potential negative effects associated with floods: the approximate number of potentially affected inhabitants; the type of economic activity in the potentially affected areas; installations, as they are mentioned in Attachment I to Directive 96/61/CE of the Council of September 24, 1996 regarding the integrated prevention and control of pollution, which may produce accidental pollution in case of floods; as well as potentially affected protected areas. Member states must ensure that flood hazard

maps and flood risk maps are completed no later than December 22, 2013. Exceptions to preliminary flood risk assessment and flood hazard and flood risk maps are set down in Article 13.

On the basis of maps mentioned in Article 6, member states establish flood risk management plans coordinated at hydrographic district or management unit level. Flood risk management plans take into account relevant aspects, such as: costs and benefits, the size and course of floods, the areas which may retain flood water, such as major riverbeds with natural retention, environmental objectives of Article 4 of Directive 2000/60/CE, soil and water management, space planning, land usage, nature preservation, and navigation and harbour infrastructure.

Flood risk management plans take into account all aspects of flood risk management, focusing on the prevention, protection, and preparation status, including flood anticipation and early warning systems, and also take into account the characteristics of a certain hydrographic basin or sub-basin. Flood risk management plans may also include the promotion of durable land use practices, the improvement of water retention capacity, as well as the controlled floodings of certain areas in case of flood occurrence. Member states must ensure that flood risk management plans will be completed no later than December 22, 2015.

When the international hydrographic district or management unit is entirely within the Community, the member states ensure coordination in the purpose of creating a unique international flood risk management plan, or to establish a set of flood risk management plans on international hydrographic district level. When these plans are not achieved, member states will draw up flood risk management plans which cover at least parts of an international hydrographic district as parts of their territory, coordinated as much as possible on international hydrographic district level. When the international hydrographic district or management unit extends across the borders of the Community, member states will take measures for drawing up a unique flood risk management plan, or establishing a set of flood risk management plans coordinated at international hydrographic district level. If this is impossible, member states will draw up flood risk management plans covering at least parts of an international hydrographic district as part of their territory. If a member state identifies a problem that has an impact over the flood risk management of its waters, but cannot be handled by the member state, it may report the problem to the Commission or any

other interested member state, and may formulate recommendations as to the solution of this problem.

In accordance with applicable community legislation, member states must place at the public's disposal preliminary flood risk assessments, flood hazard and flood risk maps, and flood risk management plans. The access to information is essential for a successful management. Let us not forget that there are great differences in the population as regards their experience with floods, financial or emotional state, and social factors (age, family structure, etc.). The population's education and instruction activity¹ represents a way to reduce the socio-economic effects of floods, and prevent human life loss. Defence measures do not set up theoretical notions, as they are closely connected to the ways in which each individual assesses his priorities. The individual in particular and the collective in general must participate as active factors in the actions of the authorities.

To conclude, the answer to the question "how certain is certain enough?" should be given while taking into account a series of aspects specific to each given situation, making reference at the same time to the common aspects, specific to all risk situations.² Consequently, there is a need for interdisciplinary studies in issues of risk. For instance, the psychological analysis of the way in which the population perceives the danger in potentially floodable areas may subserve the population's awareness for their correct flood risk assessment. As a result, a holistic approach of flood risk assessment and management can be a successful solution, enhancing the principle of integration, according to which environmental protection measures must be present in defining and implementing other policies of the European Community.

Translated by Emese G. Czintos

¹ For details, see Viorel Stănescu and Radu Drobot, *Măsuri nestructurale de gestiune al inundațiilor* (Non-structural flood management measures) (Bucharest: Editura HGA, 2002), 231-239.

² Cf. S. N. Jonkman et al., "An Overview of Quantitative Risk Measures for Loss of Life and Economic Damage", in *Journal of Hazardous Materials*, Elsevier, 1 (2003): 28.