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SPATIAL PLANNING IN FLOODPLAINS FOR IMPLEMENTATION BY THE FLOODS DIRECTIVE IN POLAND

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Abstract

In 2011, there were legislative changes made in Polish laws concerning water management and spatial planning. These changes resulted from the implementation of the Floods Directive, particularly its first stage. In consequence, the Polish government introduced legal acts altering the previously binding legislation, including those acts directly concerning the spatial development of floodplains. The Floods Directive was adopted by the European Parliament and the European Council in 2007 as a response to the growing urbanisation of floodplains. Urbanisation is causing more frequent flooding. The results are increased material (loss of property) and non-material (loss of life) losses. The main aim of this paper is to present the legislative changes introduced in Poland in relation to spatial planning in floodplains, resulting from the implementation of the Floods Directive. The paper also aims at defining how these changes may influence the future development of flood zones.

Key words

floodplains • flood protection • Floods Directive • spatial planning • water management • urbanisation effects • Poland

Introduction

Most European government policies have replaced the flood protection terms 'control' and 'protection' with the concepts of 'giving rivers their natural spaces back' and 'flood risk forecast and management' (Turner et al. 1998; Plate 1999; Burton et al. 2003;

Evans et al. 2004; Hooijer et al. 2004; DETR 2005; NDRC 2007; Thorne et al. 2007; Hall et al. 2009; Schanze 2012; Becker et al. 2013). There was a gradual transition from the principle of overcoming a flood using only technical methods of flood protection, to the principle of 'living with floods' with the focus on human security, environmental protection, and

economic development (Gąsowski & Dobrowolski 2010).

The Floods Directive established by the European Union in 2007, takes a comprehensive approach to solving the problem of increased flood risks (Meyer et al. 2012). The Floods Directive sets the framework for flood risk management. The emphasis is on the need to reduce the potential adverse consequences of flooding on human health, the environment, cultural heritage, and economic activity. If necessary, this framework also provides procedures on non-structural initiatives and/or procedures reducing the likelihood of flooding (European Union 2007). The flood risk management aims to achieve sustainable development in flood-prone areas (EKES 2005).

The Floods Directive¹ was adopted by the European Parliament and the Council of Europe in 2007 because of the increasing number of severe floods. Some reasons for the floods are climate change, and the land development policy in the area of floodplains. It is the intense and uncontrolled urbanisation in floodplain areas that makes riverside lands more vulnerable to flooding. As a result of intensified land use on the floodplains, there have been disastrous floods causing damage to valuable material (e.g. property losses). People's lives have been endangered and there have been casualties (Walczykiewicz 2002).

Nowadays, spatial planning is crucial for flood prevention (Rotko 2005). It is the most effective form of flood protection as it reduces the flood risk and mitigates the effects of floods (Grocki & Eliasiewicz 2001; Wołoszyn 2006; Warcholak & Kołodziejczyk 2007; Żelaziński 2007; Wheeler & Evans, 2009; Kaźmierczak & Cavan 2011; Richert et al. 2011; Ristic et al. 2012). According to

Ristic et al. (2012), the introduction of administrative restriction processes is the most effective way to protect floodplains against flooding, and lessen flood risk. Examples of administrative restrictions are: prohibition of building in floodplain areas, moving residential and infrastructure constructions from the floodplain areas, and controlling urban sprawl. According to Luino et al. (2012), spatial development regulations should indicate potential places for rational urbanisation. Thus, spatial planning is the best tool to use for reducing the harmful effects of flooding (Ristic et al. 2012). Spatial planning should aim to reduce the negative consequences of floods and to reduce the risk of improper land development in floodplain areas (du Plessis & Viljoen 1999).

The implementation of the Floods Directive in the EU member states is a process consisting of five stages with determined implementation dates (ec.europa.eu):

- adjusting the law of a member state (by 26 November 2009);
- providing further details concerning the introductory assessment of flood risk (by 22 December 2011);
- providing further details on the flood hazard maps (by 22 December 2013),
- providing further details on the flood risk maps (by 22 December 2013);
- preparing plans for flood risk management (by 22 December 2015).

The EU member states are obligated to meet all the requirements of the Floods Directive by the end of 2015. To date, all the EC member states, including Poland, have successfully implemented the first two stages.

The main aim of the paper is to present the legislative changes introduced in Poland dealing with spatial planning of floodplains, resulting from the implementation of the Floods Directive. The paper also aims at defining how these changes may influence the future development of flood zones.

¹ This refers to the Directive 2007/60/WE of the European Parliament and European Council, 23 October 2007 on flood risk assessment and management (<http://eur-lex.europa.eu>). The Directive concerns not only the riverside areas, but also internal sea waters, which, however, are not the subject of this paper.

Legal conditions of floodplain development prior to the implementation of the Floods Directive

It is necessary to determine the changes which have occurred as a result of legislative implementation of the Floods Directive in Poland with regard to floodplain development. The problem of spatial planning in floodplains before the Directive's implementation should be discussed. The legal conditions before the implementation of the Floods Directive cover the period 2005-2011 and are discussed in this article.

Terminology of floodplains

Floodplains are described in the Water Law Act as areas in danger of flooding (Dziennik Ustaw 2001). Before the Directive's implementation in Poland, floodplains were divided into the following areas in accordance with the Water Law:

- areas requiring protection from flooding due to land development in those areas and because of the economic or cultural value of the land;
- direct flood hazard areas – areas between the waterline and the levee or natural, high bank with the levee line built in, as well as islands and alluvions and the zone of flood tidal waves described in the land use planning based on a flood protection study²;
- potential flood hazard areas – places exposed to flooding such as water overflowing the top of a levee, or destroying or damaging levees, or destroying and damaging dammed structures³.

Classification of most floodplains was done in flood protection research studies. The inter-embankment zone, however, was

not classified. This zone was automatically considered an area that was in direct danger of flooding. A flood protection study determined the extent of the borders of flood water and the defined occurrence probability. Flood protection guidelines were also set up (Fig. 1). The study divided flood zones according to the method of land development and formation of flood terraces, depressions, and closed drainage areas. The flood zones were divided into: those areas in direct danger of flooding comprising areas used for letting out flood water, intermediate flood hazard areas, and areas requiring protection from flooding due to their development, economic, or cultural value. The person responsible for carrying out the flood protection studies was the Head of the Regional Water Management Board (RWMB) (*Regionalny Zarząd Gospodarki Wodnej - RZGW*) (Dziennik Ustaw 2001). The studies allowed for more than one border of the areas at direct and indirect danger of flooding since there was no official binding method for such studies (Biedroń & Walczykiewicz 2006). However, when determining the direct and indirect flood hazard areas, the 100 year standard was most frequently applied. This standard is

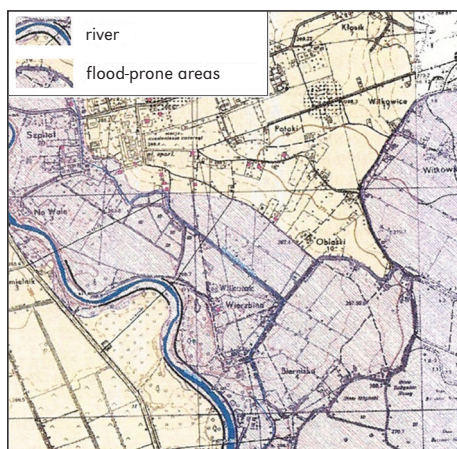


Figure 1. An example flood protection study of the Wista river made for the Regional Water Management Board (RWMB) in Gliwice – a former analogous edition

Source: Biedroń & Walczykiewicz (2006).

² Potential flood zones also comprised the sea-coast belt.

³ Potential hazard of flooding areas also include land in the sea-coast technical belt on which flooding can cause destruction or damage protective structures.

used to mean the occurrence of flood water one time in 100 years or with the probability: $p = 0.001$. Sometimes, additional flood borders, even up to seven flooding lines⁴, were determined (Fig. 2). For the areas of special social, economic, and cultural importance, in accordance with the regulations of the non-novelised Water Law⁵, the flood water estimations that were used took into account flooding which might occur at least once in 200 years (Dziennik Ustaw 2001)⁶.

Law, the list of land development restrictions was binding. Safety measures were enforced to protect the people and property in the areas with the greatest risk of flooding. Bans were made on land development, planting trees and bushes, changing the land shape, storing materials, and on any other activities which may impede flood protection (Dziennik Ustaw 2001). The law also stipulated that the Head of the RWMB could lift these bans if flood protection was not hindered. The Head

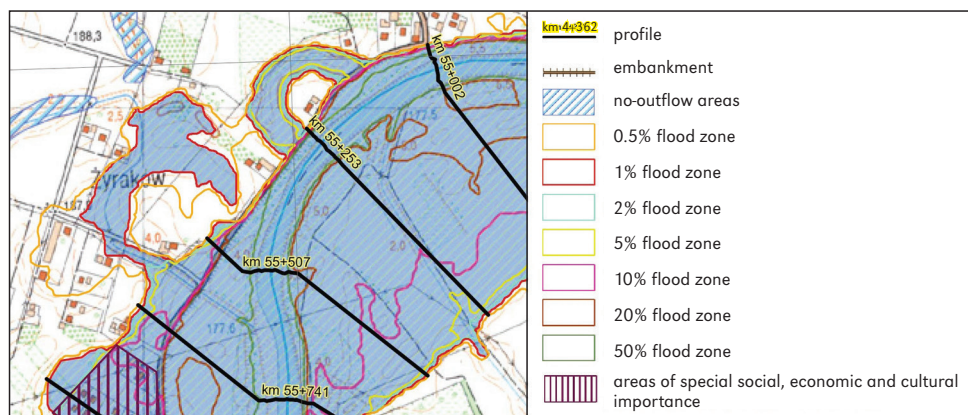


Figure 2. An example flood protection study (flood zone) of the Wisłoka river made for the Regional Water Management Board (RWMB) in Cracow – a new digital edition in a flood hazard map standard

Source: <http://oki.krakow.rzgw.gov.pl> (3 September 2013).

Management restrictions of floodplains

In the areas in direct danger of flooding, in accordance with the non-novelised Water

⁴ For catchments in the area of the Regional Water Management Board (RWMB) in Cracow, flood water extent was mapped in water protection studies for the following occurrence probabilities: 50%, 20%, 10%, 5%, 3.33%, 1%, 0.2% (Biedroń & Walczykiewicz 2006).

⁵ In this paper, the term ‘non-novelised Water Law’ is used with reference to the Act of 18 July 2001 on Water Law (Dziennik Ustaw 2001) prior to amendment to the text in 2012.

⁶ Prior to changes introduced in June 2005, in accordance with the Water Law, these areas should be protected from flood water which may occur once in 500 years (Biedroń & Walczykiewicz 2006).

of the RWMB could also indicate the methods of land cultivation and development, the types of crops to be planted as part of flood protection requirements, and the removal of trees and bushes. Moreover, in order to protect water quality in the areas having the greatest risk of flooding, landfills and sewage treatment plants as well as any undertaking which might adversely affect the environment were banned. The Law also stipulated that the Head of the RWMB may impose the above mentioned bans in other areas, by way of local law, provided the bans were justified for water protection and the security of people and property. Natural floodplains located on unembanked rivers were not protected by the land development ban. For this reason,

in accordance with the binding law, flood protection studies were elaborated first for those unembanked rivers. This was done to introduce restrictions for land development and land management of flood zones, and at the same time to protect people and their property.

Restrictions on flood levees indirectly affected floodplain development. The Water Law was meant to ensure the density and stability of levees. For this reason, the following bans were made binding: a ban on land development in the distance of 50 m from the landward foot of the levee, a ban on land cultivation, planting trees or bushes on the levees (minimal distance of planting was stated as 3 m from a levee), a ban on digging the levees out, damaging the turf and crossing

and areas located 3 m from the landward foot of the levee (Dziennik Ustaw 2001).

Spatial planning in floodplains

First, a flood protection study was done of the borders of areas at direct and indirect flood risk and those areas under special land development. Then, the Floods Directive in Poland defined the consequent restrictions in the use of the areas. The restrictions were to be considered when preparing to carry out: the provincial land management plan, the study of the conditions and policies of municipality land management as well as local land management plans and decisions concerning development and localisation of public aim investments (Dziennik Ustaw 2001) (Fig. 3).

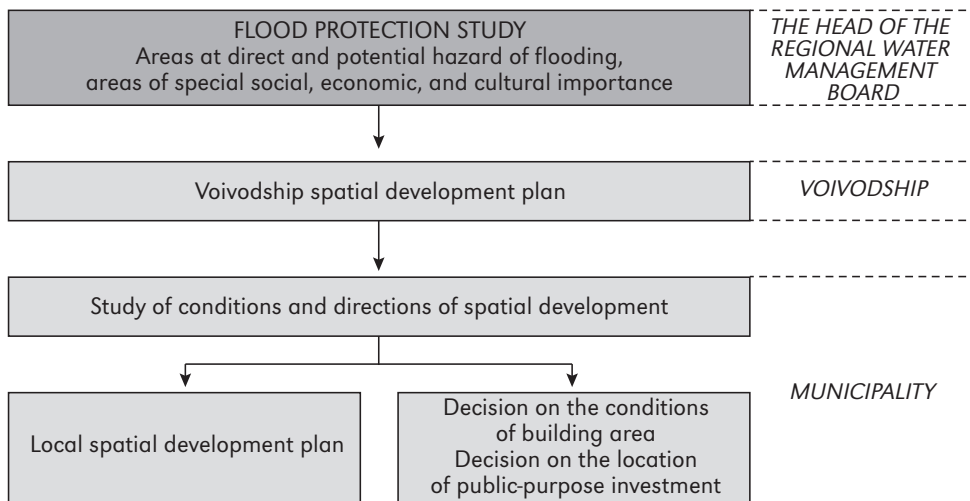


Figure 3. The process of including floodplains in planning documents prior to the amendment of law in Poland (2005-2011)

the levees or moving across the top of the levees. The bans did not, however, concern works related to maintenance, development or redevelopment of flood levees. In the case of using the levees as well as previously mentioned areas at direct hazard of flooding, the Law also stipulated that the Province Governor had the option of lifting a ban. In turn, a ‘starosta’ (district governor) could order the removal of trees or bushes from flood levees

Regulations of the non-novelised law on spatial planning and development (Dziennik Ustaw 2003)⁷ also stipulated that flood zones must be included in the conditions and policy of municipality spatial development study

⁷ In this paper, the phrase “non-novelised act on spatial planning and development” is used with reference to the Act of 27 March 2003 on spatial planning and development (Dziennik Ustaw 2003) prior to amendment to the text in 2012.

and in provincial land use planning (Dziennik Ustaw 2001). It was also required that the borders and ways of developing the flood zones in local land use planning, be determined. Land use planning had only determined one borderline for particular types of floodplains. It would be difficult to choose one flood wave zone, out of the many indicated in a flood protection study, to determine subsequent areas in direct and indirect danger of flooding. The land use plan had only determined one borderline for particular types of floodplains. The choice of flood zones was made depending on the river valley shape and other factors, so that flood generated losses would be minimised (Koza et al. 2002). The factor most frequently considered in the planning documents was the 1% water zone. Biedroń and Walczykiewicz (2006) stressed the fact that flood hazard maps, as flood protection studies were also called then, were “one of the basic planning tools, aimed at securing health, life and property of the people settled in the areas against the danger of such natural disasters”.

The resolutions of the flood protection study were compiled into spatial development plans by the Head of the RWMB. Implementing the resolutions meant that many problems needed to be faced. The first problem concerned choosing one of the several flood zones listed in the flood protection study, which contain areas of direct and indirect flood hazard. In the spatial development plans only one border was defined for individual floodplain types (Fig. 4). In the commentary to the Water Law of 2001 (Koza et al. 2002), it was stated that “the spatial development plan will include a description of one high water zone. Its choice will depend on the relief of the river valley essential for minimizing flood losses”. The choice of a particular flood zone line also depended on the current development of the area (Ryłko 2010). Planning documents usually took into consideration a 1% flood zone standard (Łyp 2005; Ryłko 2006). However, Ryłko (2006) believed that if the chosen flood zone line differed from that for 100-year-old water, then there should

be additional regulations regarding particular technological and construction requirements. These regulations refer to buildings situated outside the direct flood hazard area but still remaining within the range of the 1% flood zone.

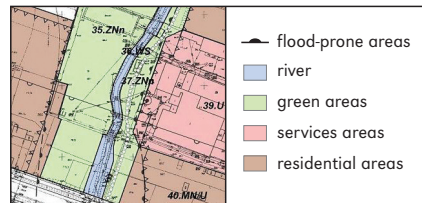


Figure 4. Local land development plan in the town of Konstancinów Łódzki on the Jana Pawła II Street (vicinity of Lutomińska Street)

Source: <http://bip.konstancinow.pl> (15 January 2014).

Copying the flood-prone area lines from the RWMB studies onto the spatial development plans was also problematic due to the different scales used. The scale used in the RWMB documents was 1:10,000, while the local plans were usually 1:1000. As a result, a correction of the flood zone line was made in the local plan, based on the flood water ordinates defined earlier in the RWMB study. The use of a relatively generalised scale in the flood protection studies resulted from the assumption that the scales will be used first in updated studies of the conditions and directions of spatial planning (made in the scale of 1:10,000), and only later in the local plans (Ryłko 2006, 2010).

It should be stressed, that the legislative restrictions on the development of flood-prone areas, stated in the Water Law, did not become legally binding when the flood protection study was compiled. When the contents were included in the local spatial development plan, then the restrictions become legally binding (Kitowski 2010; Ryłko 2010). The local spatial development plan is a local legislation document. However, the local plans referred to small areas only, and were very fragmentary, while floods and their causes and effects usually affect larger areas (Słysz et al. 1999). So, the Regional Water

Management Board's flood protection studies were not legally binding, and the RWMB did not have the power to make administrative decisions (Rotko 2005). The legal restrictions regarding land use were effective only in the inter-embankment zone, where for instance, construction was generally forbidden (Ryłko 2010). As a result, natural floodplains situated on unleveed rivers were not protected by building restrictions. A similar problem was reported by Słysz et al. (1999): floodplains in unleveed areas were not indicated, thus they were automatically not included in spatial development plans. In the 1990s, floodplains in unleveed areas were supposed to be specified by the *voivode* (a governor of a province). Flood protection studies were first and foremost produced for unembanked rivers, mainly mountain rivers. These rivers were characterised by rapid rising water. As a consequence, such studies were developed for a small number of rivers in Poland. There were no flood protection studies of the main Polish rivers.

Before the Directive was implemented in the country, the time allowed for making changes in the spatial development plans, after defining the floodplain areas in the flood protection studies, was not formally set. The procedure could have lasted a very long time (Grzonka 2004; Ryłko 2010)⁹. For this reason, it was impossible for the RWMB to enforce restricted use of the established direct and indirect flood hazard zones (Grzonka 2004; Kitowski 2010). Therefore, investments made in floodplain areas were often based on outdated land development plans. Construction in flood-prone areas was usually allowed. The municipalities could decide when to introduce changes in the development plans but this worked against the legislator's intentions. The boundaries of direct

flood hazard areas were to be included in the development plans. Future losses would then be reduced and there would be proper protection against floods. This, however, was not accomplished, because having compiled their study, the RWMB was unable to enforce its effects (Grzonka 2004; Kitowski 2010). In Rotko's opinion (2005), municipalities should have been obliged to include floodplains in the local development plans. Grzonka (2004) advised introducing the following changes: setting a time limit for implementing changes in the current spatial development plans, taking into consideration the spatial range of flood-prone areas as established in the RWMB studies, and accepting the development restrictions concerning these areas. Another solution could be for these studies to treat direct flood hazard areas as areas which require new local development plans. This would mean that the municipality would have three months to start work on new plans⁹ (Grzonka 2004).

Furthermore, it was necessary to arrange with the relevant Head of the General Water Management Board, provincial land development plans and the province development plan (*Dziennik Ustaw* 2001, 2003). These arrangements concerned the development of the areas exposed to flood hazard. As indicated by the Law, the aim of the above was to protect people and property from floods.

As regards the study of the conditions and directions of spatial development, the only requirement was that the Head of the RWMB had to evaluate the flood-prone areas (*Dziennik Ustaw* 2003)¹⁰. This meant the Head had a much weaker position and much less authority to enforce the restrictions in floodplain development (Rotko 2005).

⁹ E.g. in the case described by Grzonka (2004) the RWMB in Poznań compiled a study for unleveed areas, which defined the boundaries of direct flood hazard areas. After the study was passed to all the municipalities in the district, only two of them introduced necessary changes to the spatial development plans. Ryłko claimed that the use of the Cracow RWMB's studies in spatial development planning was insufficient.

⁹ Establishing the areas for which it is required to prepare a local plan is based on article 10 of the Act of 2003 on spatial planning and development (*Dziennik Ustaw* 2003).

¹⁰ An amendment to the earlier act on spatial planning and development introduced the need to evaluate and abolished the former requirement of consulting the Head of the RWMB about the proposed conditions and directions of spatial planning.

Consequently, studies since 2005 have allowed construction in flood-prone areas.

On the other hand, the spatial planning and development act stated that decisions concerning land development conditions and the localisation of public institutions had to be discussed only if they required a legal water permit (Biedroń & Walczykiewicz 2006; Ryłko 2006). The introduction of the next amendment to the spatial planning and development Act in 2012 (Dziennik Ustaw 2003, 2012b), made it compulsory to consult the Head of the RWMB about decisions regarding land development and the localisation of public institutions in areas exposed to flood hazard, defined in the flood protection study. If such a document was not available, it could be replaced by a study on the conditions and policies of the municipality spatial development. The study would take land development and management into account (Dziennik Ustaw 2003, 2012b,c). The decisions issued in 2003-2010 allowed unrestricted land development in flood-prone areas (Grzonka 2004).

The task of the RWMB includes checking whether the submitted project includes flood-prone areas, whether the floodplain boundaries correspond to the ones defined in the flood protection study, and whether the suggested form of spatial development in flood-prone areas is justified (Ryłko 2006). The RWMB also analyses the detailed solutions for the areas exposed to direct flood hazard. Analysis is done mainly in terms of the restrictions imposed on this area (Ryłko 2010). For instance, the RWMB may demand that the local plan include a change of the designation of some areas lying within the flood-prone zone, from forestation to farming. The demand, in this case is based on the Water Law regulations regarding planting the inter-embankment area with trees and bushes (Ryłko 2006, 2010). According to the procedure, a plan must be approved by appropriate authorities, however, it must be stressed that the evaluation is not binding for the plan-making bodies and can be negative.

Legislative implementation of the Floods Directive in floodplains in Poland in terms of spatial planning

The first stage of the Directive's implementation in Poland involved adjusting the Polish law to the Directive's requirements. These adjustments meant that stipulations were to be considered in the Polish legislation. This stage was completed with over a one-year delay, at the beginning of 2011. A law was passed¹¹ which introduced a number of changes into the Polish legal acts, such as the Water Law (Dziennik Ustaw 2001, 2012a,c), and the Act on spatial planning and development (Dziennik Ustaw 2003, 2012b,c). The most significant changes took place in the Water Law. Basic ways of protecting people and property against flood were described in more detail (Dziennik Ustaw 2001, 2012a,c), comprising the points already existing in the novelised Water Law. A new element was also introduced – ice breaking action. Some points of the law were expanded. For example, reconstruction was added to the maintaining and creating of the water retention systems, and to the construction and development of anti-flood structures considered their maintenance. In turn, the construction and maintenance of bypass channels was removed from the law. The law novelisation did not, however, include a direct statement by the World Wide Fund for Nature about promoting non-technical means of flood protection resulting from the Floods Directive (WWF 2008)¹².

New floodplain terminology

It should be underlined, that as a result of legislative implementation of the Directive, the terminology of particular types of floodplains was changed (Tab. 1). The terms were also

¹¹ The Act of 5 January 2011 on the amendment of the Water Law and other laws (Dziennik Ustaw 2011).

¹² Non-technical means of flood protection involve restoration of natural floodplains.

differentiated according to degree of flood hazard. Flood zones are still understood as floodplains, in general. The flood zones are not the ones determined, as it used to be, in a flood protection study, but in an introductory flood risk assessment (Fig. 5), which was one of the first stages of Directive implementation. Following the Floods Directive’s implementation, areas at direct hazard of flooding were referred to as areas at special hazard of flooding, including those areas at low and high hazard of flooding. They still comprise the inter-embankment zone (Dziennik Ustaw 2001, 2012a,c). The proper name ‘areas of potential flood hazard’ was removed and replaced by the descriptions: areas exposed to flooding in the case of water overflowing the levee top, destroying or damaging flood levees, destroying or damaging damming structures (Dziennik Ustaw 2001, 2012a,c). The way of determining flood areas was finally precisely defined by giving the exact probability of flood water occurrence to the assigned hazard degree. The precise definitions are: once in 500 years – low hazard level, once in 100 years – medium hazard level, and once in 10 years – high hazard level. The term

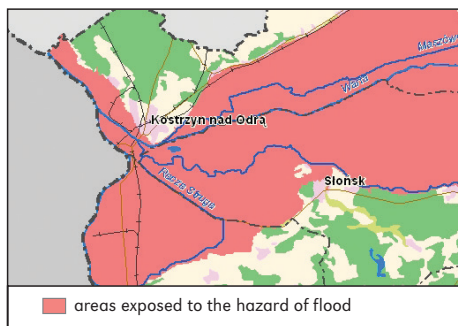


Figure 5. An example flood introductory assessment of flood risk in Poland with areas exposed to the hazard of flood

Source: <http://www.kzgw.gov.pl> (3 September 2013).

‘first class floodplains’ was also changed. These floodplains were previously protected from floodwater that might occur once in 200 years, due to specific and valuable land development. At present, the factor taken into consideration is not the way the land is developed, but the low hazard level determined beyond the floodwater extent, with an average occurrence once in 500 years, or with the probability $p = 0.002$, or that there is a probability of an extreme event.

Table 1. Terminology changes in the classification of floodplains (areas exposed to the hazard of flood) resulting from the legislative implementation of the Floods Directive in Poland*

Floodplain classes	
before legislative implementation	after legislative implementation
<p>Areas requiring protection from flooding due to their land development and cultural and economic value (with floodwater occurrence probability of at least once in 200 years)</p> <p>Areas at direct hazard of flooding</p> <ul style="list-style-type: none"> the zone of flood wave determined in the land use planning based on a flood protection study, areas between the river line and flood levee or a natural high bank with a build-in flood levee, as well as islands and alluvions (<i>inter-embankment zone</i>) <p>Areas at potential hazard of flooding – areas at hazard of flooding in case of water overflowing the levee top, destroying or damaging flood levees, destroying or damaging damming structures</p>	<p>Areas in which the hazard of flood is low, it is once in 500 years or in which there is a possibility of extreme event</p> <p>Areas at special hazard of flooding – areas in which the flood hazard is:</p> <ul style="list-style-type: none"> medium, once in 100 years, high, once in 10 years <p>and areas between the river line and flood levee or a natural high bank with a build-in flood levee, as well as islands and alluvions (<i>inter-embankment zone</i>)</p> <p>Areas exposed to the hazard of flooding in case of water overflowing the levee top, destroying or damaging flood levees, destroying or damaging damming structures</p>

Source: own work based on the Water Law.

* The table does not include the sea-coast technical belt.

New floodplain management restrictions

As a result of the Directive's implementation, the list of bans on the development and management of particular types of floodplains was not changed. This primarily concerns the areas at special hazard of flooding, where the restrictions of 'former' areas at direct hazard of flooding are binding (Dziennik Ustaw 2001, 2012a,c). There is also a possibility that the Head of the Regional Water Management Board (RWMB) can lift the bans on 'new' areas at special hazard of flooding, on the condition that it would not impede flood protection.

In the novelised Water Law, the list of bans and restrictions in the development of flood levees and the possibility of being exempted from them by the Province Governor remained unchanged. It was also added that the planned undertakings must not have a negative affect on the density and stability of levees. The possibility of the 'starosta' (district governor) giving an order to remove trees or bushes from flood levees and the areas within a distance of 3 m from the levee landward foot (Dziennik Ustaw 2001; 2012a) was also kept in existence.

At the same time, the novelised Water Law more specifically defined the procedure for issuing decisions concerning exemptions from the development ban of special flood hazard areas and embankments and their immediate neighborhood. The Head of the Regional Water Management Board (RWMB) may request the opinion of a hydrological-meteorological service to decide if any intended actions will or will not impede flood protection. Moreover, when applying for a decision, a description of the planned undertakings should be attached along with: basic technical data and the description of planned work technology, a topographic map with the outline of planned objects and works. If necessary, hydraulic and hydrological calculations, e.g. in the case of planning works which may impair the structure of the body, should be included. A decision is valid for two

years (Dziennik Ustaw 2001, 2012a,c). The procedure of issuing such a decision introduces a significant change in the process of spatial planning in floodplains. A decision may be issued for a strictly specified undertaking. It may also not be used for preparing local land development plans, as happened before the implementation of the Floods Directive in Poland. Earlier, the Head of the Regional Water Management Board (RWMB) could issue exemption decisions concerning a land development ban in flood hazard areas. Previously, as acts of municipal law, land development plans were accepted in floodplain areas determined for development (Fig. 6). The only restrictions had to do with land development defined by the Head of the Regional Water Management Board (RWMB). The construction of embankment or elevating the ground level were often included in the definition.

Apart from the above, the legislator continued to allow the decisions made by the Head of the Regional Water Management Board to be carried out concerning the methods of cultivating and developing land, and types of crops to be planted resulting from the requirements of flood protection as well as the removal of trees and bushes necessary to ensure proper conditions of flood water flow (Dziennik Ustaw 2001, 2012a,c). The Head of the Regional Water Management Board's ability to introduce bans was also retained, and would be binding in areas with a high hazard of flooding, not only in the 'former' areas where there was a potential hazard of flooding but also in all areas where the hazard may be undetermined (Dziennik Ustaw 2001, 2012a,c) (Tab. 1). This is another advantage of implementing the Floods Directive in Poland.

As a result of the 2011 amendment to the Water Law, the function of the flood protection studies will be taken over by flood hazard maps, in 2014. The maps define areas where the probability of flooding is low (once in 500 years) or where an extreme event is probable. These are particularly flood-prone areas as well as areas in danger of flooding in a situation when water has flowed over the

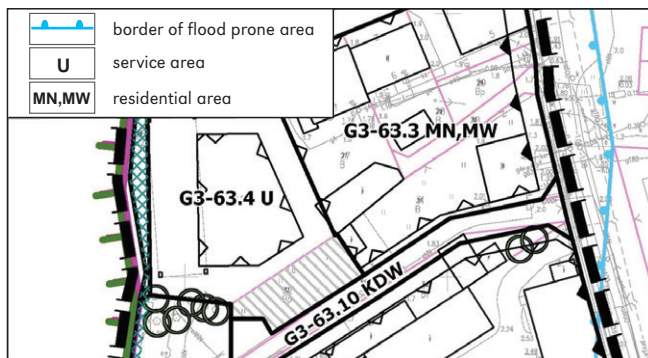


Figure 6. Local land development plan in the town of Gryfino on the Targowa Street, Poland, 2011

Source: <http://www.gryfino.pl> (3 September 2013).

levee crown, or the levees or weirs have been damaged or destroyed. Flood water depth and speed of flow will be determined (Dziennik Ustaw 2001, 2012a,c) (Figs. 7, 8).

New spatial planning in floodplains

Until the flood hazard maps are drawn, flood protection studies are binding in Poland. The determined borders remain the areas at direct and indirect hazard of flooding. The flood protection studies and the determined borders were included in the land use planning until the end of 2013. Until the 'new' flood-prone areas marked on flood hazard maps are included in the planning

documents, the direct flood hazard areas, pointed out by the Head of the RWMB and included in the current planning documents, are considered to be those areas particularly exposed to flood risk. This means that until the flood hazard maps are finished and given to those preparing the planning documents (the due date was given as the end of 2013), the direct flood hazard areas pointed out by the Head of the RWMB were to be taken into consideration (Dziennik Ustaw 2011). The amendment to the Water Law added in 2011 set the deadline for drawing up the flood hazard maps and flood risk maps (Figs. 7, 8, 9) at 22nd December 2013. This ensured that the maps would be made,

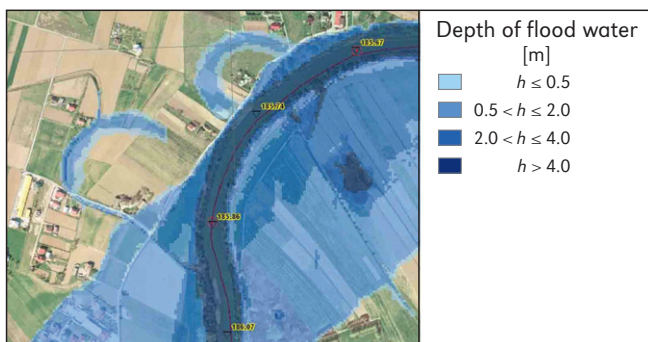


Figure 7. An example flood protection study (depth of flood water) of the Wisłoka river made for the Regional Water Management Board (RWMB) in Cracow – a new digital edition in a flood hazard map standard

Source: <http://oki.krakow.rzgw.gov.pl> (15 January 2014).

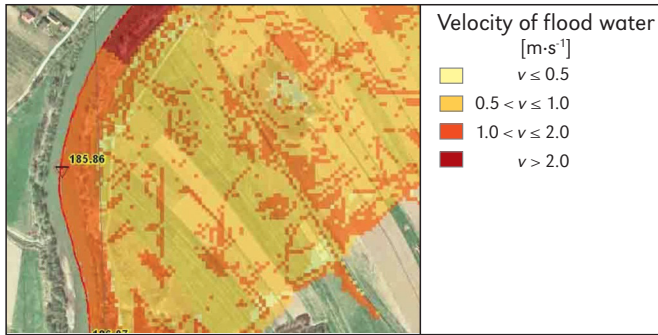


Figure 8. An example flood protection study (velocity of flood water) of the Wisłoka river made for the Regional Water Management Board (RWMB) in Cracow – a new digital edition in a flood hazard map standard

Source: <http://oki.krakow.rzgw.gov.pl> (15 January 2014).

because so far, the preparing flood protection studies was not considered compulsory. Moreover, as a result of implementing the Floods Directive in Poland, the time for introducing changes into the current planning documents (e.g. local plans and studies) was set at 18 months from the day the 'new' flood hazard maps were submitted to the city president and to the province president (Dziennik Ustaw 2001, 2012a,c).

It should be also underlined, that regulations stipulated in the flood risk management plans will have to be included not only in the planning documents at the province and municipality level, but also in the formation of spatial development of the country (Dziennik Ustaw 2001, 2012a,c).

Summary

Summing up, as a result of legislative implementation of the Directive, the terminology of particular types of floodplains has been changed. The areas at direct hazard of flooding have been called the areas with a special hazard of flooding. The proper term of "areas at potential hazard of flooding" has been removed. These areas are still determined and described as areas threatened by flooding as a result of water overflowing the top of a levee. The novelised Water Law defines the way of determining particular classes of floodplains. The exact probability of floodwater occurrence is assigned to the floodplains. This solves the problem of selecting the one

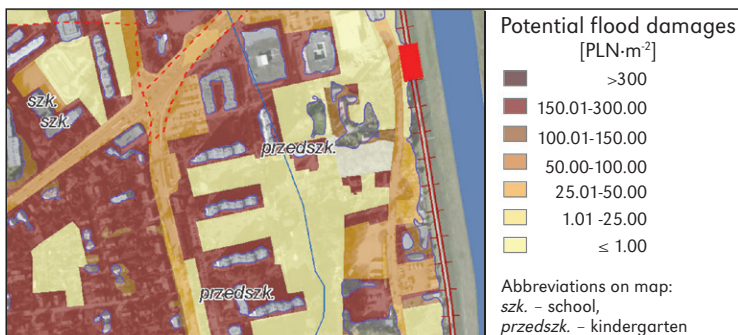


Figure 9. An example flood risk map (flood damage) of the Oder river in Opole in Poland

Source: <http://mapy.isok.gov.pl> (4 March 2014).

appropriate for spatial development planning from among the many flood lines determined in the 'former' flood protection studies.

As a result of the Directive implementation, the list of bans on land development and the list of bans on managing the floodplains have not been changed. This concerns both the areas at special hazard of flooding with binding restrictions on direct hazard of flooding, and the restrictions concerning levees. For introducing bans on land development and management in those areas with a special hazard of flooding, it is important to note that the territorial range has been broadened. Other areas have been comprised; not only the areas beyond the line of flood levees ('former' areas at potential hazard of flooding) but also ones for which the flood hazard level has not been defined.

Importantly, the deadline for the new maps of flood hazard and risk, precisely defined in the Floods Directive and consequently in the novelised Polish legislation, ensures their execution¹³. To date, the elaboration of flood protection studies has been optional. Moreover, setting the precise date by which changes have to be implemented in the spatial development plans, ensures the introduction of limitations and restrictions as regard floodplain development. As a result, flood hazard maps will be taken into consideration in spatial development planning. Local land management plans did not always include the range of a flood hazard, which resulted in the development of land situated directly along water courses. Starting from 2014, spatial planning must include new borders for floodplains.

The 2011 amendment to the Water Law also solved the problem of the municipalities' unwillingness to include floodplain boundaries in their spatial development plans (Grzonka 2004; Ryłko 2006). Ownership rights or, actually, the right to construction was limited.

The result could be a change in the land value and the municipality being obliged to

pay compensations¹⁴ (Żelaziński 2001; Grzonka 2004; Kitowski 2010). Another reason why municipalities were unwilling to include floodplains in the spatial development plans was that local development possibilities would then be limited. The development of attractive areas would be blocked (Słysz et al. 1999; Rotko 2005; Kitowski 2010). All this made the regulations dead letters (Kitowski 2010). Some self-governments avoided approving local plans which took floodplains into account and the self-governments issued decisions regarding land development, especially before 2010. Up till then, such decisions usually did not required the Head of the RWMB's approval (Ryłko 2006).

It should be stressed, that an implementation of the Floods Directive in Poland meant that strict procedures could be developed concerning decisions on the exemption from the development ban, in floodplains which are not included in the procedure of local land development. Decisions that let build-up in the flood hazard areas will be only issued for each specified undertaking. The process of issuing exemptions from bans related to the usage of flood levees, has also been regulated.

The Floods Directive's implementation of the law regulating the spatial development in flood zones will allow for rational land development in floodplains. Compliance with the restrictions and prohibitions in the management of floodplains will take place. According to Kitowski (2010), the Directive will enable preventive spatial planning, that is planning preventing the increased risk of flooding in floodplains.

It must be stressed, however, that the procedure of preparing local spatial development plans and the obligation to take into account floodplains and the restrictions pertaining to them, depend on the date when

¹³ *Introductory assessment of flood risk*, elaborated in 2011, determined for about 900 rivers. The flood hazard maps must be included.

¹⁴ The obligation to pay compensations comes from the Act of 2003 on spatial planning and development (Dziennik Ustaw 2003, art. 36). It is interesting, in the case of introducing restrictions on the development of the potential flood risk areas by the Head of the RWMB, it is the Head of the RWMB and not the municipality that pays the compensation (Rotko 2005).

it was formally decided that such procedures had to be prepared. Nevertheless, due to the very long time needed to compile local plans, it often happens that the currently prepared plans are based on old legal regulations. Such a course of action only partly makes it possible to run a rational (preventive) spatial policy in flood-prone areas.

Finally, Polish changes in flood hazard management fit the basic European trend of giving rivers more space by reducing urban development in floodplain areas of the river. However, spatial planning is not sufficient enough to prevent all flood damages. Given the dynamic urban processes resulting in built up areas of floodplain zones, increasing public awareness about the potential negative consequences of floods is also essential (Salazar et al. 2012).

In Poland, the legislative changes carried out under the Floods Directive concern not only the issue of preventive floodplain management, but also other aspects of flood risk management. These aspects include: raising public awareness of flood risk by making flood hazard and flood risk maps widely available, the activation of local communities

by enabling them to participate in the development of the flood risk management plans. At this moment in Poland, when the Floods Directive's initiatives are not yet finished, it is hard to determine whether the amended legal regulations will provide reasonable floodplain use and it is hard to know whether flood risk will be reduced. The changes in Poland have been positive so far, and the effects will be seen in a few years.

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