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SPATIAL PLANNING IN FUNCTION OF FLOOD PROTECTION – METHODOLOGICAL APPROACHES FOR BALCAN COUNTRIES

Abstract: The spatial planning system is an very important instrument for implementation of strategic and local measures for flood protection. Implementation of systemic flood protection measures implies improvement of spatial planning methodology from land-use to the strategic and integrated approach and new spatial info-documentation base relevant for planning in conditions of climate change, such as river basin management, integrated flood management, flood risk assesments, risk maps etc.

This paper shows the necessity of improvement the spatial planning in Balkan region of all levels with an aim to define systemic protection measures against flooding in space, harmonized with general guidelines of action plans in flood managements and strategic documents that deal with protection against floods in countries in Balkan region.

Key words: floods, protection, flood management, spatial planning, methodology.

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1. INTRODUCTION

Great floods which hit the Balkan region (Bosnia and Herzegovina, Serbia and Croatia) in May, 2014, causing huge damage and casualties, have actually intensified the flood protection activities at a wider regional and national level. The extreme amount of rainfall, unusual for this region happened in short time intervals of 2004, 2006, 2010 and 2014. This actually points to the climate change and the necessity to explore, monitor and adapt the life activities as well as the use of space and goods in accordance with potential risks and critical situations. Harmful consequences of floods in 2014 (Figure 1) have also shown numerous lacks regarding the management of basins and lack of flood protection measures in the urban and rural space.

Urgent measures taken during the floods included building of dikes on the Sava and Drina river banks, building of canal in the Bijeljina region and installation of pumping stations. Many problems were identified such as the lack of appropriate protection dikes along river banks and the lack of some other forms of rain regulation (water rooms in rural zones, regulation line of water flows on damns, sewage system in urban zones, etc.). It is evident that the best results are achieved at the regional level by systemic work on protection against the river flooding as it requires interstate and regional cooperation, defining and strengthening of legal, institutional and strategic action, which presents the basis for efficient measures and action at the local level.

The improvement of spatial planning system can be an instrument for implementation of strategic and local measures for flood protection. This field has been included in the existing action plans, but has not seriously been taken into consideration yet. Implementation of systemic flood protection measures in space implies improvement of spatial planning methodology and new spatial info-documentation base relevant for planning in conditions of climate change, and it also requires implementation of integral planning what is close connected with the flood management.

Therefore, this paper will try to light the role of spatial planning in flood protection in accord with the recommendations of World Meteorological Organization (WMO) and Global Water Partnership (GWP) in the Associated Programme on Flood Management (APFM).

The aim is creating guidelines for methodological approaches in all levels of integrated spatial planning, harmonized with flood management plans and strategic documents. The space of Bosnia and Herzegovina will be especially pronounced in terms of legal regulations and spatial planning methodology.

Figure 1 – Floods in May 2014 in biH, Serbia and Croatia (source:https://images.search.yahoo.com)

2. FLOOD MENAGEMENT

The natural events result from various meteorological, hydrogeological and human factors such as excessive rainfall or graundwater level or a reduction in ariver's conveyance capacity due to siltation, ice jams or inadequate land-use practices [20] (Table 1).

Table 1 – Factors contributing to flooding (source: http://www.floodmanagemet.info/publications/tools/APFM?07.pdf)

Meteorological factors	Hydrological factors	Human factors
– Rainfall – Cyclonic storms – Small-scale storms – Temperature – Snowfall and snowmelt – Cyclones	– Soil moisture level – Groundwater level prior to storm – Surface infiltration rate affected by vegetation, soil texture, density, structure and soil moisture – Presence of impervious cover such as snow and ice – Channel cross-sectorial shape and roughness – Presence or absence of overbank flow, channel network – Synchronization of runoff from various parts of watershed	– Land-use activities such as urbanization increase runoff volume and rate – Occupation of the floodplain obstructing flows – Structural flood-control measures such as embankments upstream – Greenhouse-gas emissions which may affect climate change and frequency and magnitude of precipitation events. – Decrease in conveyance of the river channels owing to build-up of river debris, restriction of waterways, dumping of minerals, rubbish and other waste – Mining and other industries alter water regimes, pollute water channels and affect ecosystems; can also alter water courses.

There is interaction between them on many ways. In generally, there is interaction between land and water environment in space and time. During the floods there are essentially three connected fluxes: water, sediments/nutrients and pollutants that create harmfull influence to the environment and urban area [20].

Land-use activities should be harmonised with metheorological and hidrological factors as well as with the other natural, built and socioeconomic environment in aim to manage with the risk of flood on sustainable and resilience way. It means that societies have to cope with flood hazard by attempting to reduce risk on the damage to an acceptable level. This “acceptable level” varies according to the perception of the risk of a given society and should therefore be adapted to the community concerned by the flood problem. [20]

Flood controle and protection measures have played an impotrant role in protecting people and socio-economic development from flooding in the past. They have lagerly relied on structural solutions, such as embankments, bypass channels, dams and reservoirs. That structural flood controll measures sometimes were folowed with non-structural measures such as flood forecosting and land use regulations but it was partial and non comprihencive. In the last two decade flood management is recognized as the higest model of comprihensive, sustainable, resilient and responsible human answer to the challenges of floods in condition of climate change.

The concept of flood management varies depending on the country where it is carried out and the overall aim that is given to flood-management policy. For example, in some countries, the term “flood management” is still used synonymously with “flood control”, emphasizing the control approach focusing on river engineering and structural flood-management measures. While those structural measures also form part of flood management, the control approach is slowly losing the central position. Societies increasingly recognize that floods can be controlled only to a limited extent and that a residual risk of flooding always exists.

Flood menagement requires planning process which should involve all organizations, institutions or communities that could affect or be affected by the hydrological processes of the river basin. Also, they are developed at different administrative levels as part of sectoral planning. These include: Basin or Catchment Flood Management Strategy; Basin or Catchment Flood Management Plan; Local Flood Management Plan and Project Plan [20].

The diferent plans vary largely according to spatial and temporal scales. The first two are prepared for wider areas and time horizons up to several decades. The latter two types of plans are prepared on rather small spatial scales and timescales of months or a few years. In these local plans, a variety of specific issues can be addressed such as flood-hazard mapping needs, regulatory standards and procedures, areas where repeated flood losses have occurred, local flood-defense requirements, river-bed corrections and adjustments, etc. Those plans should be the part of spatial info-documentation base for spatial planning for all spatial levels.

IFM is a process promoting an integrated – rather than a fragmented – approach to flood management within the framework of Integrated Water Resources Management (IWRM). It integrates land and water resources management in river basins and coastal areas in order to maximize the efficient use of floodplains while minimizing loss of life and property from flooding. (WMO, 2009, Figure 2)

Taking a wider view of the interactions between land and water environments within a river basin, and of the broader socioeconomic and environmental implications of floods, the IFM approach provides a sound conceptual basis to bring about a convergence between land-use planning and flood management [20].

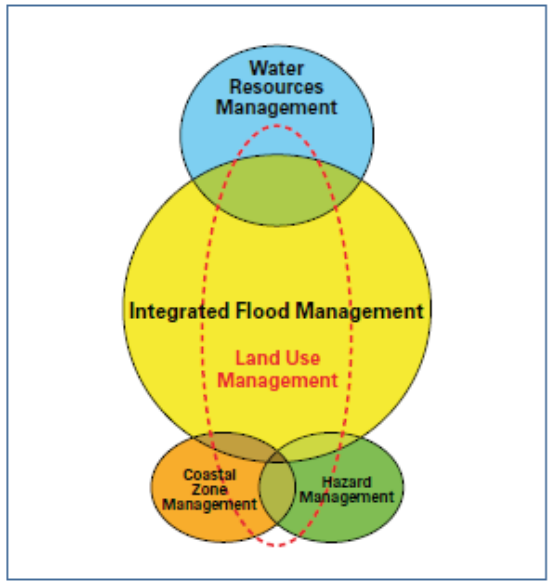

Figure 2 – Representation of the integrated flood management approach (WMO, 2009)

Integrated Flood Management (IFM) approach has the aims at:

- Maximizing the net benefits from flood plains
- Reducing loss of life as a result of flooding
- Reducing flood vulnerability and risks
- Preserving ecosystem and their associated biodiversity. [6]

The basic concept of the IFM approach, presented in the integrated Flood Management Concept paper (APFM, 2004) is based on five key elements:

- Adopting a basin approach to flood management

- Bringing a multi-disciplinary approach to the flood management
- Reducing vulnerability and risks due to flooding
- Enabling comunity participation. [6]

3. SPATIAL PLANNING AND FLOOD MANAGEMENT

3.1. Spatial planning

Spatial planning is socio-political and professional process aimed at the welfare of the people, control of land use, the arrangement of the urban environment and the protection and improvement of the natural environment. Spatial planning is critical for delivering economic, social and environmental benefits by creating more stable and predictable conditions for investment and development, by securing community benefits from development, and by promoting prudent use of land and natural resources for development"(UNECE, 2008) It is multidisciplinary process involving professionals from many areas in common to planning activities. In accordance with administrative division of the territory and jurisdiction, spatial planning has a few levels: federal or national level; state or district level and municipal or local level. In some countries term 'spatial planning' refers on federal/national, and state/district level, while 'urban planning' or 'city planning' refers to the municipality and local level. In some terminology 'land–use' means spatial planning.

The objective of sustainable development is creating and *maintaining* prosperous social, economic, and ecological systems [7], [4] that are adaptive and able to flourish and grow in the face of uncertainty and constant change. Achieving sustainability requires innovation, foresight, and effective partnerships among corporations, governments, and other groups. While it is not possible to tell the future, governments and other agencies can equip themselves to adapt to the turbulence ahead. The complex nature of urban space shifted to the idea of resilient environments in the 1970s in the field of ecology through the research of Holling who defined resilience as "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" [10]. Humanity has a strong *need for persistence* and depends on services of ecosystems for its wealth and security. That's why humanity and ecosystems are deeply linked. As a result, it is imperative that humanity strives for resilient socio-ecological systems through sustainable development [18].

Other theories define resilience as "the ability of a system to absorb disturbances and still retain its basic function and structure" [23] as "the capacity of a social-ecological system to continually change and adapt yet remain within critical thresholds" [8]. Thus, the resilience of the built environment may be the key to global sustainability.

Spatial planning must embrace all the processes happening in society, economy, and environment [1]. Natural and created processes and their interactions are complex and require integrated planning and management of all developing processes, including the creation of sustainable and resilient urban environments [17],[25].

Among the different spatial aspects (environment, building structures, spatial functions, social activities, economy, politics, people, culture, institutional framework, etc.), there are mutual influences and regulations accepted by integrated planning [1], [25]. It is important to analyse all of them, particularly the environment and its natural processes, with the aim of planning for the mitigation of the causes of climate change and preservation of ecosystems.

3.2. Relation between spatial planning in flood menagement

IFM promotes the use of technical, economic, social and administrative actions in order to address the complexity of each context. Considering a flood management strategy that would focus only on reducing damage potential would lead to the development potential of flood plains being largely ignored. Taking a closer look at the strategies and options for flood management, it becomes apparent that land-use planning and measures of spatial regulation play a central role in reducing flood risk. All that measures can be classified into three main pilots of flood management strategy: reducing flood hazard, reducing flood vulnerability and exposure and preserving the natural resources of floodplains [21]. Therefore, there is an interaction between spatial planning and flood management, and it is desirable that the spatial planners are involved in the development flood management, such as spatial plans must be harmonized with the flood management and maps of flood risks.

In this sense, the measures in flood management which are connected with land-use and space should be defined in plans for all spatial levels in accordance with the system of planning. The measures in domain of the spatial regulations on the level of river basin or wider territory with a few urban areas, such as afforestation, permeable pavement, room for the river, dams, dykes etc. should be defined in the strategic plans (Spatial plan of region or district). The necessary part of a spatial info-documentation base for strategic spatial planning should be River Basin Strategy or Management, Forestry Management, River Management, Coastal zone management etc. The state is responsible for this level of spatial documentations and its obligatory is to provide management plans. Very often, international cooperation is necessary for creating flood management or strategy for river basins.

The measures in domain of local level such as land-use, zoning, building restrictions etc. should be defined in the urban plan (general plan) and regulatory plan (plan of detail regulation). All the measures of the local level should be harmonized with the strategic plans (and flood managements recommendations) and with the local conditions. Maps of risk of floods are necessary for this level of planing. It is also desirable that municipalities provide flood risk assessments, flood plain regulations, maps of landslides etc. documentations in aim to complete and update a spatial info-documentation base for integral urban planning.

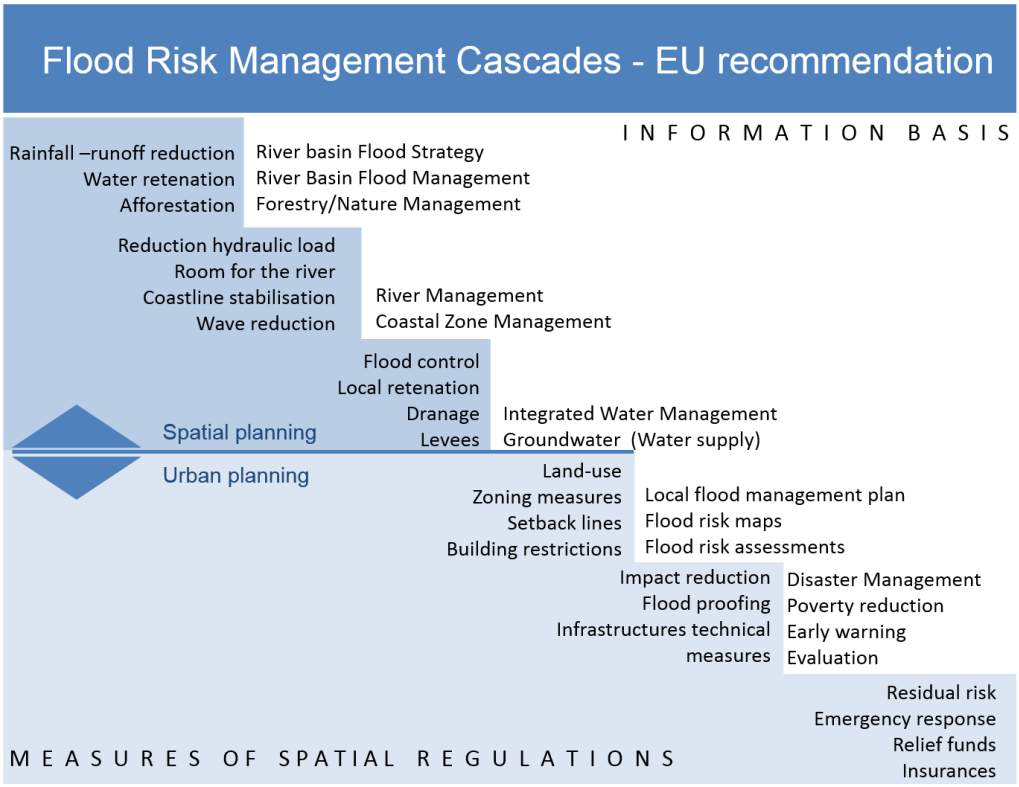

Figure 3 – Flood risk management cascade (EU recommendation) and measures of spatial regulations in system of planning.

4. EU FLOODS DIRECTIVE AND CURENT PRACTICE IN EU COUNTRIES

The EU umbrella document which regulates floods is the EU Floods Directive (2007/60/EC). The purpose of the Directive is aiming at the reduction of the adverse consequences of floods for human health, the environment, cultural heritage and economic activity. All stages of the flood risk management cycle should be realised: prevention, preparedness, early warning, response, recovery and lessons learned whereby all actors have to contribute. EU Floods Directive requests the managing of flood risk with providing the safe level of protection. That means reducing the flood risk to the acceptable level and consideration of climate change. Land use planning is becoming more important in that approach. The requirements for member states were to carry out a preliminary assessment to identify areas at risk of flooding (2011), to draw up flood maps (2013) and to establish flood risk management plans that focus on prevention, protection and preparedness (2015) [11].

Many European countries have taken significant steps in accordance with the EU Floods Directive. In Holland, thanks to cooperation of professional institutes (e.g. Deltares) and state institutions, modern simulation models have been developed. They can help draw up flood risk maps and improve spatial planning that will define planning spatial regulation with an aim of having proper protection against floods. The Dutch society, by involving the ministry, water boards, professional institutes, and local stakeholders, is implementing the risk reduction strategy against floods through planning and building of rooms for the river, dike strengthening and reduction of the consequences (evacuation, improved spatial planning).

One of the biggest national Dutch projects *The Room for the River*. "The Dutch department for Public Works and Water Management" (Rijkswaterstaat) is working to give the Rhine River more room at over 30 locations, protecting 4 million people who live in flood –prone areas. The Room for the River-project will be completed up to 2016, and will increase the discharge capacity of the Rhine to 16.000 cubic meters of water per second without flooding. All 30 measures are designed to lower the flood level. One of the biggest locations is the river room in the city Nijmegen [24].

Slovakia has adapted the EU Flood Directive to specifics and possibilities of its territory by bringing up of a package of Emergency Response Measures to be deployed at national, regional and local level and feasibility study & cost-benefit analysis. That also included institutional support network that will unite all key aspects: organization, responsibilities, tasks, facilities, experience, expertise, time and logistical aspects [11]. In spite of EU, Balkan countries adopt the recommendations of the European directives much more slowly.

5. ACTIVITIES IN FLOOD MENAGEMET AND PROBLEMS IN BALKAN REGION

Activities referring to integral water management of the Danube basin which also included the countries of the Balkan region, were initiated in the 90s of the 20th century (Convention on Cooperation for Protection and Sustainable Use on the Danube River, signed in 1994, enforced in 1998) with an aim of harmonizing with the EU directives on flood risk management in the territories of the Danube basin. International Commission for the Protection of the Danube River (ICPDR) was formed. All the signing countries committed themselves to creating plans on flood risk management in the territories of the Danube basin by the end of 2009. Four countries (Slovenia, Croatia, Bosnia & Herzegovina and Serbia) ratified the Contract on the international basin of the Sava River in 2002, and committed themselves to creating a joint plan of integral water resources management of the Sava river basin. The International Commission for the Sava River was formed in order to carry out joint tasks and with an aim of harmonizing with the Plan at the higher level that ICPDR is in charge of [2]. The activities had started in this respect, but in 2014 were again initiated within the countries affected by the floods in the Balkan region.

There were several regional conferences supported by international institutions, which attracted public institutions, professional and academic experts. The topic was floods and climate change as a wider frame for understanding current problems in space and society. One of them was the regional conference „Floods in South-eastern Europe – lessons learned and further steps" in 2014, organized by the B&H Ministry of Security in cooperation with the OSCE Mission in Sarajevo and the Centre for security cooperation Racviac from Zagreb. The representatives of different state and entity institutions relevant for floods in B&H, Slovenia, Croatia, Serbia, Macedonia, Romania, Albania, Montenegro and Turkey, then representatives of international organizations OSCE, UNDP, UNICEF, WMO and ECHO all took part in the Conference. The aim of the Conference was strengthening of the institutional framework in the regional countries, and therefore the „Action plan for protection of floods and river management in B&H 2014-2017" was actually drafted during this Conference.

The topic regarding climate change has been a hot topic at both global and regional level for several years. Within this topic, many planning approaches have been considered and even found their place in spatial planning, however more in a theoretical rather than practical sense [14]. Therefore, the period of the late 20th century, which also overlapped with the social transition of the Balkan countries up to now has still been interesting in terms of planning methodology improvement in the spirit of contemporary principles. This implies, along with the acceptance of all specifics regarding social movement and changes in the environment, also the update and mapping for the needs of creating spatial information system and integral planning [12]. We can stress a big problem of creating new spatial database which refers to natural conditions (climate, ground, landslides, water, air, biotic factors) as well as natural resources especially in the field of renewable energy sources. Energy efficiency as one of responses to climate change has been implemented in laws in the majority of the Balkan countries, but its implementation is at the very beginning.

Protection against floods in the conditions of climate change implies making development decisions on the basis of information about current and potential future risks of extreme hydro-meteorological events [9]. This also means that each community or country will be ready for risks that it can cope with [22]. In that aim, integral flood management where spatial planning actually serves as an instrument that should respond to new development needs through the implementation of integral spatial planning based on application of relevant spatial data including the climate change as well. Therefore, the new planning model should be enhanced in the area of data update on the climate change and in the implementation of the flood risk maps in the process of integral planning which has not been entirely and systematically implemented in the region. The lack of strategic studies on natural resources and conditions greatly contributes to this.

Studies dealing with the river basin management should be made as they would make up an important part of info-documentation base on spatial planning which is necessary for spatial planning at local, state and regional level, where the spatial plans of wider territories should be a base for creation of urban plans (in accordance with the legal

regulation). For the Balkan region which was affected by floods in May, 2014, the Sava river basin is relevant. There was a special draft plan for it called 'The Management plan for the Sava River basin' dating December 2011, supported by the EU. It contained the information gathered in the five Balkan countries where the Sava River flows (Slovenia, Croatia, Serbia, B&H and Montenegro).

This document emphasizes the synergy between the risk management against floods and basin management. It has been pointed out that in the Sava river basin, there is a system of preserved retention areas (especially in the middle and lower part of the basin), which is unique in Europe. Good management of those areas can provide useful solutions in order to have the environmental objectives from the Framework Directive on Waters achieved. At the same time, it can ensure efficient protection system against flooding of the Sava River, and it would be useful for several countries in the region. The existence of the dike against floods, as emphasized in this document, can have a bad effect on the good water condition. Therefore, it is necessary to analyze all aspects including the real effects of the flood protection in the wider region [13].

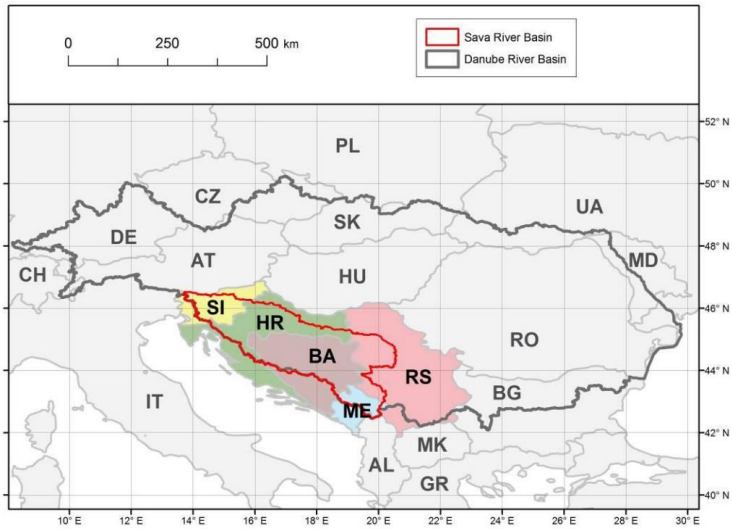

Figure 4– Insert of 'The Management plan for the river basin' –Draft plan dating December 2011.

5.1. Action plan for flood protection and river management in B&H 2014-2017

Conclusion from the Conference 'Floods in SE Europe – lessons learned and further steps' dated November 2014, have been greatly incorporated in the 'Action plan for flood protection and river management in B&H 2014-2017', and adopted in January 2015 by the B&H Council of Ministers.

This document has created a framework for systemic action in B&H by defining six groups of measures which are to be implemented in the following period, and addressed to appropriate institutions to make an estimate of the funds needed for implementation. The

first measure refers to damage remediation; the second one refers to harmonization of the system for flood protection in B&H with the EU Directive 2007/60/EC on estimates and flood risk management. The third group refers to adoption of new technical solutions regarding flood protection, erosion and torrents for settlements and towns which did not have any water control structures against floods [3].

It is evident that this measure cannot be implemented without previously defined spatial plans on the regional and local level, which will establish the protection system on the broader territory and the kinds of structures in accordance with all specifics and influential factors on spatial decisions. Only after the plans have been made, it is possible to define technical solutions and implement them on field. The action plan lists spatial planning within the need of inter-institutional coordination (the fifth group of measures), but without identifying the need to have the model improved and developed in order to have adequate planning in conditions of climate change and flood risks, which is one of recognizable objectives in flood management in EU.

The action plan, in any case, represents the largest framework, which creates important social-institutional base for action in the field of flood protection. In the following period, it would be necessary to make the changes in the law so the new information could be used in integral spatial planning from the regional to the local level with a good response to the flood risks. That is still not happening.

6. INTEGRATED PLANNING AND FLOOD PROTECTION

The transition from traditional land-use planning to strategic planning was crucial for the development of the methodology of the integrated planning process. Strategic planning is about process, institutional design, and guidelines for integrated development.

The role of planners in this approach changes from one of merely providing expert opinion and technical leadership to mediating between and communicating with stakeholders [25]. Teriman (2012) defined eight steps in the integrated planning approach: (1) redefine the problems in the domains of environment, society, economy, and institutions; (2) reconsider goals and objectives; (3) reassess alternatives; (4) re-evaluate selection; (5) development feasibility; (6) construction; (7) completion/delivery; and (8) occupation (Figure 5). This model offers sustainability assessment, which takes place after (4) and (8), as a very important mechanism for controlling the planning process. From that point, activities could be back to step (1) redefine the problem.

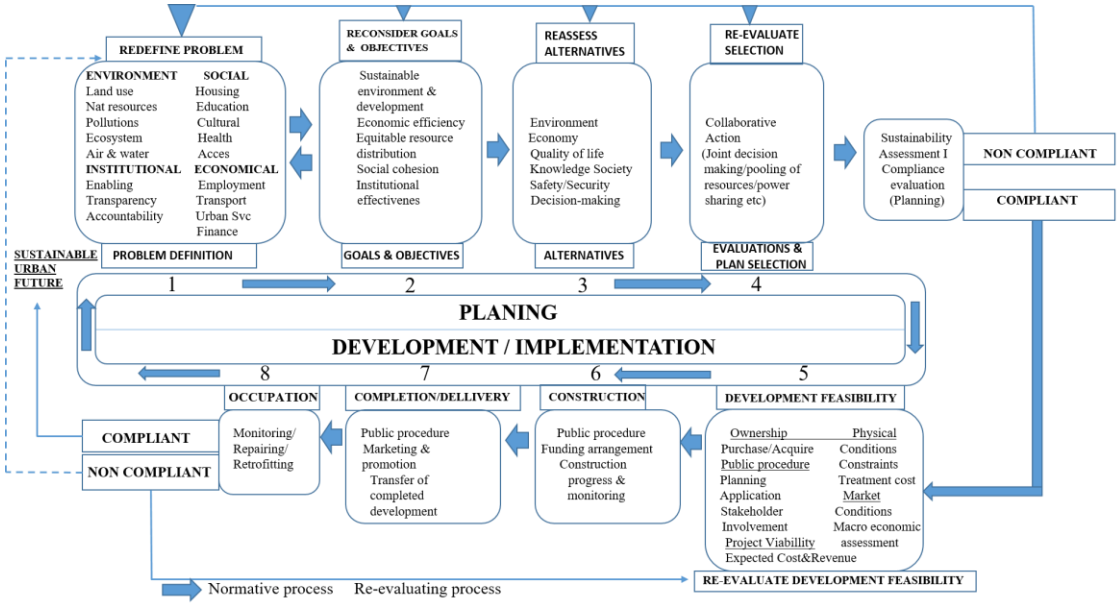

Figure 5– Proposed integrated urban planning and development process (Yigitcanlar & Teriman, 2014).

There are numerous sustainable urban development assessment methodologies that measure different sustainability dimensions of the built and natural environments such as land use, transport model, urban infrastructure, urban-ecosystem, etc., which support integrated urban planning and development processes.

A multidisciplinary analysis of all relevant environmental factors that influence planning – such as geomorphology, geology, seismology, natural resources, renewable energy resources, vegetation, climate change including risk of floods– as well as factors generated by human activities (such as construction, urban facilities, residential housing, education, cultural/health access, and the economy) is crucial for a comprehensive and integrated planning approach. Given the complexity of urban space in the domains of environment, society, economy, and institutional framework, such an analysis has the potential to redefine the problems, goals, and objectives of planning.

There is a necessary interaction among the basic planning steps that needs to be achieved in the process of integrated planning and management of the sustainable development and resilient urban space and environment. The whole planning process presents cycles in which the steps and activities influence each other.

It is also necessary to ensure the participation of all stakeholders in the development and implementation of the plan. Strengthening participation through the involvement of citizens in the planning and decision-making process is an important prerequisite to a

comprehensive review of the problems and needs of the population, especially at the local level.

Integrated planning involves the flexibility achieved by using zoning and abandoning strict regulatory planning [5].

To plan a sustainable and resilient urban space, it is important to create a spatial information system with all the relevant data that will allow a comprehensive understanding of the phenomenon of urban space and natural environment. GIS technology has been adopted as a tool for the creation of a database for sustainable planning and management of different spatial categories and resources [19].

The database that records climate changes and their effect on urban space and the environment is especially important for the implementation of integrated planning, as well as for measures to protect sustainable and resilient urban space and the environment from harmful effects [16]. Protection against floods in the context of climate change implies making development decisions on the basis of current and potential future risks of extreme hydro-meteorological events [9]. Therefore, some countries in the EU, like the Netherlands, create maps of risk and flood hazards, wind, and other extreme climatic conditions to support planning for resilience.

In addition to creating a spatial information system, it is necessary to continuously update the database on natural processes, disasters caused by climate processes, and anthropogenic activities (floods, storm, extreme temperature, soil erosion, landslides, desertification, deforestation, etc.), and processes that are the result of human activities and planning processes (land use, construction, housing, transport, water supply, solid waste, energy and technology resources, education, culture, health, protection of cultural heritage, etc.). Evidence of planning documents and the transition dates of all elements of planning regulation, from the present to a planned state, also represent a part of the planning process and require continuous updating. Using GIS in planning and collecting spatial data and the education of staff in new approaches to planning and urban management are also necessary for an integrated planning process.

Institutional support and regulation frameworks, which are also included in integrated planning processes, are preconditions for sustainable development. That's why the integrated planning approach is more developed and implemented in the EU than in the Balkan region.

7. GUIDELINES FOR IMPROVING SPATIAL PLANNING METHODOLOGY IN ORDER TO PROTECT FROM FLOODS IN BALKAN COUNTRIES

Flood risk management cascades which are defined by EU Directive (Figure 3) shows that the spatial planning with its measures of spatial regulations is the mechanism for flood risk management implementation. National and regional spatial levels should be

covered by strategic spatial plans (spatial planning), while the lower spatial levels (municipalities and cities) should be defined by urban planning. River basin is the widest territory of flood influences and very often requires strategic national or international measures which are most efficient in the field of flood protection. Those measures require state intervention, and often interstate cooperation on the management of the river basins, as it is the case with the Sava basin in the middle of the Balkan region. The spatial plans of the states or regions, than could define general spatial solutions for flood protection which are guidelines for plans of detail regulation.

System of planning in Republic of Srpska and Serbia defines two main categories of plans:

- strategic plans (spatial plan of state, spatial plan of region, spatial plan of municipality and spatial plan of space of specific facilitiy) in domain of spatial planning and urban plan (B&H) or plan of general regulation (Serbia) in domain of urban planning, and
- detail plans (zoning and regulatory plan in B&H) or plan of detal regulation in Serbia in domain of urban planning.

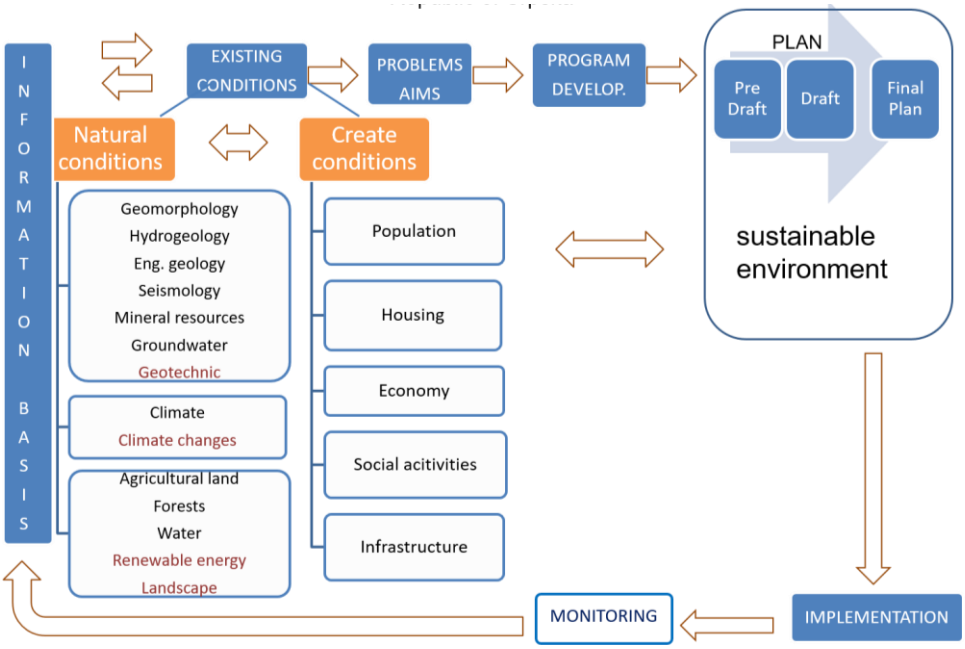

Figure 6. Planning scheme model according to the Law on Spatial Planning and Construction of the Republic of Srpska.

The current methodology of spatial planning on the Repubic of Srpska defined by law (Figure 6) has a few steps: preparatory phase and collecting spatial information basis, analysis and assessment of the existing condition, the problems and aims of planning,

program development, conceptual planning phase, implementation and monitoring. In practice, it is evident that the implementation and monitoring phase are not developed enough although those phases are especially important when it comes to the impact that climate change might have on the planning solutions. As a matter of fact, the planning solutions should include potential dangers and risks which can be the result of the climate change. This may require additional analyses and application of new methods and techniques in planning. The core of planning adapted to the new conditions and the natural environment constitutes adequate information base and plan drafting, which is still not sufficiently present in the current legislation and the planning process.

Prior spatial informational basis, such as the strategic study on the river basin and flood management, forest and nature, and flood risk maps, should be carried out. That would enable creation of satisfactory strategic spatial-planning documentation (spatial plans of countries, regions/cantons, municipalities) which can be a prerequisite for creation of urban and technical documents for building hydro-technical structures.

We should also stress that studies on river basin and flow management, then on water, forest and nature management at national and regional level, should include the aspects regarding flood protection as a base of spatial-planning documentation. These documents, through the space analysis and its features, should give guidelines (in terms of locations, their facilities for a certain kind of regulation and types of structural intervention) for defining flood protection measures. They should be recognized and defined in the form of rainfall-runoff reductions, water retentions, forestation, reduction hydraulic load, rooms for the rivers, coastline stabilisation, wave reduction, local retention, drainage, levees, zoning measures, setback lines and building restriction.

Flood protection in urban areas should be defined in plans, and all strategic elements of the flood protection measures should be taken from the spatial plans from the broader territory. On the urban level, adequate zoning of the space purpose conditions for building structures and infrastructure (levelling of roads, planning and designing of infrastructure especially hydro-technical structures, drainage systems, position of structures, line cables, ground floor level building, structure installations) should be performed in order to have necessary planning and building flood protection measures.

It is also necessary to improve the spatial planning methodology through integral planning in the conditions of climate change [15]. That implies drawing up of new topic maps in all spatial-planning documents which would show the areas of risk (including floods) due to climate change. Planning building conditions in the inhabited zones should take into consideration flood and wind risks, terrain instability, natural resources of renewable energy sources and possibility of their use, energy efficiency in planning and building etc. All this are still not included in the spatial-planning documentation on the comprehensive way. At the same time, planning practice in Balkan countries in the period of transition is not enough multidisciplinary and participatory process.

In order to have the planning methodology improved in the spirit of climate change and flood protection, it is, also necessary to change and amend the laws in the field of spatial planning in the majority of countries in the Balkan region. In RS that would be the amendment to the Law on Spatial Planning and Building and to the Rules on the content of planning documentation. They should include info-documentation base of planning (updated information about climate change, engineering-geological maps with new zones of landslides formed after floods, maps of flood and other risks, and of potentially other consequences in conditions of climate change).

8. CONCLUSION

Spatial planning is a basic instrument for having integral flood management, which is one of phenomena of climate change at the global level. There is interaction between flood management and spatial planning. In order to have all measures from action plans implemented that have a spatial component, it is necessary to have all the planning documentation from strategic plans to urban level of regulation. The documentation should be, in accordance with the Law on spatial planning, a base for technical documentation and actual building. It is necessary to start planning with strategic spatial planning documents – spatial plans, but based on the studies of basin and river management, management of forests and natural reserves and on flood risk maps. In the majority of the countries in the Balkan region, it is evident that there is a lack of relevant strategic flood studies and flood risk maps in conditions of climate change, as well as the lack of spatial plans that deal with this topic integrally at a strategic level of planning. Therefore, planning in inhabited areas is limited in taking into consideration strategic regulation measures in a broader river basin or flow area, and yet they should be the base for urban planning. It is necessary to solve the spatial zoning and building conditions by urban planning, and in accordance with flood risks, as well as with other consequences of climate change. More active inclusion of spatial planning into the issue of flood protection in the light of climate change requires improvement of spatial planning methodology in aim of more integrated approach and change of laws dealing with space. With the measures offered in the action plans (example of B&H), the importance and role of spatial planning with an aim of having adequate flood protection, has still not been quite acknowledged. The measures have also not been taken to improve planning methodology into integrated one and laws regarding space. Therefore, the society should more actively participate in these activities through state, scientific and other professional institutions.

QUESTIONS:

1. What does it mean: ‘flood protection’, flood management’ and ‘integrated flood management’?
2. Relation between flood management and spatial planning from national to the local level.

3. What are the problems in flood management in some Balkan countries?
4. What are the main characteristics of integrated planning?
5. What are the guidelines for improving planning methodology in Balkan countries in domain of flood protection?

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