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Operationalizing the Resilience of Local Communities to Flood Risk: A Capital Approach and Assessment Model

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Abstract

Floods are among the most widespread and devastating natural hazards in Serbia, causing significant human, material, and environmental losses and slowing long-term local and national development. The consequences of floods do not arise only from the characteristics of the natural event. However, they are largely conditioned by the human factor, i.e., the way space is used, the degree of urbanization, planning, infrastructure quality, and institutional readiness to manage risk before, during, and after the event. Based

on modern approaches to disaster risk management, the paper focuses on resilience, reflected in the local community's ability to preserve key functions, reduce losses, adapt to changing conditions, and ensure rapid and sustainable recovery. However, experiences following the major floods of 2014, as well as numerous studies, have shown systemic weaknesses and highlighted that existing solutions are often insufficiently coordinated. In addition, local capacities are uneven, and preventive measures remain insufficiently developed to meet the needs of risk-exposed areas. For this reason, strengthening local governments and building resilient communities are considered strategic priorities. This is because risks are identified more quickly, resources are coordinated effectively, and safety measures that impact citizens are implemented more directly at the local level. Based on this, the paper specifically emphasizes that local governments have a dual role: as the bearer of planning and regulation (spatial planning, urban measures, risk assessment) and as the coordinator of operational activities (preparation, alerting, evacuation, care, and recovery). The paper aims to offer a practically usable framework for strengthening local communities' resilience to floods by conceptualizing and analyzing relevant normative and institutional frameworks. Special attention is paid to the integration of investment (infrastructural) and non-investment measures (organizational, educational, planning, and communication), as well as to their coordination across different levels of governance, with clear division of responsibilities and cooperation mechanisms. The focus is also on harmonizing local policies with modern legislative and strategic solutions of the Republic of Serbia, including the Law on Disaster Risk Reduction and Emergency Management (2018), which encourages more systematic risk management and strengthening prevention. The paper shows that flood risk management cannot be based solely on the traditional "flood defense" model. Still, it requires a shift towards an adaptation approach and the concept of "living with floods", which implies continuous reductions in vulnerability and improvements in capacity. In this context, in addition to classic protection measures, the systematic strengthening of community resources and capacities — natural, economic, infrastructural, human, social, and institutional — is crucial, because it is precisely their quality that determines how ready a community will be to prevent damage, respond to an event, and recover without long-term disruption. Additionally, the paper highlights the importance of partnerships among local governments, public enterprises, the civil sector, and business to pool resources and implement measures more quickly and efficiently.

Keywords

Integrated risk management, economic disasters, systemic risk, resilience, vulnerability, trade fragmentation, economic risk management.

1. Introduction

Floods are among the most frequent, extensive, and destructive natural hazards worldwide, causing severe human, material, economic, and environmental consequences (Kljajić, Popović, & Grujić, 2016; Ćuzović, 2019). Their effects extend well beyond the immediate physical impact of inundation, as they disrupt social functioning, damage critical infrastructure, weaken local economies, degrade ecosystems, and slow long-term development processes (Cvetković, 2017a; Cvetković, 2017b; Cvetković et al., 2016; Cvetković et al., 2018; Cvetković et al., 2017). In many countries, especially in flood-prone regions, the severity of flood impacts is shaped not only by the intensity of the hydrological event itself, but also by patterns of exposure, the degree of vulnerability, the quality of spatial planning, the condition of infrastructure, and the preparedness of institutions and communities to manage risk effectively (Kron, 2005; Bekić & McKeogh, 2013).

The Republic of Serbia is particularly exposed to flood risk due to its geographical position, hydrological characteristics, and the growing influence of climate-related extremes (Sekulić, Dimović, Krnajski-Jović, & Todorović, 2012; Milović, 2018). Floods have long been among the most significant natural hazards in the country, repeatedly threatening human safety, property, agriculture, infrastructure, and the environment (Đorđević, 2017; Gavrilović, Milanović-Pešić, & Urošev, 2012). Although floods were historically treated as unavoidable natural phenomena and often interpreted as an "act of God," contemporary research and disaster risk reduction practice increasingly emphasize that their consequences are strongly conditioned by human decisions, land use patterns, urbanization, environmental degradation, institutional capacity, and the extent to which prevention and preparedness are integrated into public policy (Ndini, 2020; Milović, 2018). In this respect, flood risk cannot be understood solely as a product of nature; it is also a consequence of insufficient adaptation, uneven development, and weaknesses in risk governance (Mančić, 2025; Elkheir et al., 2025; Iftikhar & Iqbal, 2023; Iftikhar & Iqbal, 2024; Rebouh et al., 2024; Kron, 2005; Stefanović, Gavrilović, & Bajčetić, 2014).

The catastrophic floods of 2014 represented a turning point in Serbia's understanding of flood risk and disaster management. In addition to causing extensive human suffering and enormous economic losses, they exposed serious weaknesses in prevention, preparedness, interinstitutional coordination, and post-disaster recovery (Bjelić & Lazarević, 2016; Izveštaj o svrsishodnosti revizije – Prevencija poplava u Republici Srbiji, 2019). These events clearly demonstrated that reactive approaches are insufficient and that local communities must be strengthened as the first and most immedi-

ate arena of disaster risk reduction. Since risks are identified most quickly, resources are organized most directly, and protective measures are implemented most concretely at the local level, local self-government units occupy a central position in flood risk management (Ahmed, 2025a; Ahmed, 2025b; Paudel et al., 2025; Rahman et al., 2025; Inusa et al., 2025; Stefanović et al., 2014; Milosavljević, 2012). Their role is not limited to formal administration. Rather, they function simultaneously as planners, regulators, coordinators, and operational actors responsible for risk assessment, spatial and urban planning, preparedness, warning, evacuation, assistance, and recovery (Ljuboja, 2013; Zakon o smanjenju rizika od katastrofa i upravljanju vanrednim situacijama, 2018).

For this reason, strengthening the resilience of local communities has become one of the key priorities of contemporary disaster risk management (Cvetković, 2026; Milenković, 2025; Cvetković et al., 2026a; Cvetković et al., 2026b; Cvetković & Radonjić, 2022; Sendai Framework for Disaster Risk Reduction 2015–2030, 2015; Tierney & Bruneau, 2007). In this context, resilience does not refer only to the ability to resist and absorb flood impacts, but also to the capacity of a community to preserve essential functions, reduce losses, adapt to changing conditions, and ensure timely and sustainable recovery (Pavićević, 2016; Tiernan, Drennan, Nalau, Onyango, Morrissey, & Mackey, 2019). Such an understanding requires a departure from the traditional model of "flood defense," which relies predominantly on technical protection measures, and a shift toward a broader and more adaptive framework based on the concept of "living with floods" (Kljajić et al., 2016; Tozier de la Poterie & Baudoin, 2015). This approach assumes that the complete elimination of flood risk is neither possible nor realistic and that long-term safety depends on the continuous reduction of vulnerability, the strengthening of capacities, institutional learning, and social adaptation (UNISDR, 2009; Sendai Framework for Disaster Risk Reduction 2015–2030, 2015).

A particularly useful framework for understanding local resilience is the capital-based approach, which views resilience as the result of the interaction of several key community resources (Mayunga, 2007). These resources include natural, economic, physical, human, social, and institutional capital, the quality and availability of which largely determine how effectively a local community can prevent damage, prepare for a hazard, respond under pressure, and recover without prolonged disruption (Mayunga, 2007; Anđelković & Kovač, 2016). Natural capital affects environmental stability and the ability of ecosystems to mitigate the impacts of hazards. Economic capital determines the availability of resources for prevention, emergency response, and reconstruction. Physical capital includes critical infrastructure and facilities necessary for protecting the population and ensuring service continuity. Human capital reflects the knowledge, skills, health, and adaptive capacities of

the population. In contrast, social and institutional capital shape trust, participation, cooperation, and the quality of governance, all of which are essential in crises (Al-Maruf, 2017; Husted, Opper, & Park, 2022; Sanyal & Routray, 2016). Considered together, these dimensions provide a more comprehensive basis for assessing resilience than approaches focused only on infrastructure or legal regulation (Mayunga, 2007; Nikolić, Galjak, & Taradi, 2020).

In Serbia, the importance of strengthening local resilience has increasingly been recognized within the normative and strategic framework of disaster risk reduction. The adoption of the Law on Disaster Risk Reduction and Emergency Management in 2018 marked an important step toward a more systematic and prevention-oriented approach (Zakon o smanjenju rizika od katastrofa i upravljanju vanrednim situacijama, 2018). This legal framework, together with the relevant provisions of the Law on Waters, the National Strategy for Protection and Rescue in Emergency Situations, and the National Programme for Disaster Risk Management, created the basis for a more integrated understanding of local responsibilities in the field of flood risk reduction (Zakon o vodama, 2010/2012/2016/2018; Nacionalna strategija zaštite i spasavanja u vanrednim situacijama, 2011; Nacionalni program upravljanja rizikom od elementarnih nepogoda, 2014). Nevertheless, despite these normative advances, important challenges remain. Preventive capacities are unevenly developed, local resources differ significantly across municipalities, and the practical coordination among institutions, public enterprises, civil society actors, and the private sector is often insufficient (Anđelković & Kovač, 2016; Nikolić et al., 2020). Consequently, there remains a need for analytically grounded and practically applicable models that can assist local governments in identifying weaknesses, setting priorities, and strengthening resilience in a more coherent, operational way.

Starting from these considerations, this paper seeks to contribute to the conceptualization and operationalization of local community resilience to flood risk by applying a capital-based approach and developing an assessment model relevant to local self-government units. The paper is based on the assumption that resilience cannot be strengthened through isolated measures alone, nor through exclusive reliance on emergency response mechanisms. Instead, it requires the coordinated development of normative, institutional, infrastructural, social, economic, and human capacities, supported by clear planning, intersectoral cooperation, and alignment between local and national disaster risk reduction policies (Mayunga, 2007; Sendai Framework for Disaster Risk Reduction 2015–2030, 2015). In that regard, the paper aims to offer a practically applicable framework for understanding and strengthening local resilience to floods, while also contributing to the broader discussion on integrated disaster risk management in Serbia and similar contexts.

The significance of this research lies in bringing together two perspectives that are too often treated separately in practice: the institutional and legal perspective on local disaster governance, and the community-capacity perspective grounded in resilience resources. By linking these dimensions, the paper provides a broader basis for assessing the readiness of local self-government units to address flood risk and for identifying those areas in which additional investment, reform, education, or coordination is needed (Barik et al., 2025; Dada et al., 2025; Janković et al., 2025; Popović Mančević, 2025; Renner & Mayr-Veselinovic, 2025). In doing so, it also supports the transition from a narrowly reactive model of disaster management toward a more preventive, adaptive, and resilience-oriented framework better suited to contemporary flood risk conditions (Tiernan et al., 2019; UNISDR, 2009).

This paper aims to conceptualize and operationalize the resilience of local self-government units to flood risk in the Republic of Serbia through a capital-based approach and to develop an assessment model applicable at the local level. More specifically, the study seeks to identify the key normative, institutional, infrastructural, economic, human, natural, and social factors that shape local flood resilience and to examine how their interactions influence communities' capacity to prevent, prepare for, respond to, and recover from flood events. In doing so, the paper contributes both theoretically and practically: theoretically, by linking the resilience literature with the governance and disaster risk reduction framework; and practically, by offering a structured basis for assessing local capacities, identifying weaknesses, and supporting more integrated and preventive flood risk management policies in Serbia and comparable contexts.

2. Flood risk in the Republic of Serbia

Among natural hazards affecting the Republic of Serbia, floods have consistently attracted the greatest attention, primarily because of their frequency, intensity, and the scale of the damage they produce. They stand out as the most significant natural hazard in the country and one of the most serious threats to the safety of the population, the stability of infrastructure, and the continuity of social and economic life. Although floods have accompanied human societies throughout history and were once interpreted as unavoidable natural events or even as an "act of God," their destructive potential has become far more evident in recent decades. This growing severity is closely related to the adverse effects of human activity on the environment. Intensified climate change, disturbances in the hydrological cycle, inappropriate land use, and increasingly frequent heavy precipitation have all contributed to an increase in flood risk across the region. This trend is also supported by

data indicating that since 1980, Europe has recorded 325 flood events, 200 of which occurred after 2000 (Kljajić et al., 2016, p. 586). In Serbia itself, between 2016 and the first half of 2019, the Government declared a state of natural disaster six times, while both fluvial and flash floods have become increasingly common and destructive (Performance Audit Report, 2019).

The effects of floods reach virtually every segment of society. Their consequences include the loss of human lives, damage to public health, destruction of residential and other buildings, displacement of the affected population, degradation of the natural environment, damage to cultural heritage, and the disruption of everyday economic and social activities. These effects are not limited to immediate destruction alone. In many cases, indirect consequences are even more demanding, since their elimination requires more time, resources, coordination, and institutional effort than the initial emergency response.

This chapter, therefore, examines several closely related issues. It first addresses the distinction between hazard and risk, concepts that are often misused as if they have the same meaning. It then explains the concept of flood risk and how it is assessed and managed. After that, attention is directed toward defining floods, identifying their main characteristics and types, and explaining the transition from the traditional perception of floods as an uncontrollable force of nature toward the contemporary adaptive concept of "living with floods." In the second part of the chapter, special emphasis is placed on the influence of climate change on the growing intensity of floods, on the available means of flood defense through structural and non-structural measures, and on the seriousness of the harmful consequences that this hazard may produce.

2.1. Flood hazard, flood risk, and flood risk assessment

A general definition of hazard is provided in the UNISDR terminology, according to which hazard refers to "a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage" (UNISDR, 2009, p. 17). Building on this understanding, Stefanović and colleagues (Stefanović, Gavrilović, & Bajčetić, 2014) describe flood hazard as a qualitative and dimensionless fact, meaning that danger exists. However, it is not yet expressed through measurable quantitative characteristics. In simpler terms, a flood hazard is the possibility that a harmful event could occur, regardless of whether it ultimately happens.

Since hazards may be classified by origin, floods are categorized as climatic hazards, alongside tornadoes, cyclones, droughts, hurricanes, storms, and snowstorms (Stefanović, Gavrilović, & Bajčetić, 2014, p. 60). Over the last several decades, the number of factors contributing to increased flood hazard has evidently grown, while the intensity and frequency of this natural hazard have also increased. A significant share of these developments can be linked to human activities that intensify climate change, alter hydrological regimes, and thereby increase the likelihood of flooding (Kron, 2005, p. 58). Bekić and McKeogh define flood risk as the combined effect of the probability that a flood event will occur and the possible harmful consequences it may have for human life and health, property, cultural heritage, and the environment. In that sense, probability is the estimated likelihood that a flood of a given magnitude will occur in the future. At the same time, the severity of consequences depends on the characteristics of the flood itself, such as flow velocity, water depth, speed of onset, and duration, as well as on the vulnerability of the exposed population, infrastructure, and environment, including factors such as the average age of the population, the resilience of buildings, and the organization of flood defense (Bekić, & McKeogh, 2013).

To manage flood risks effectively, it is necessary to prepare a preliminary flood risk assessment, flood hazard maps, flood risk maps, and a flood risk management plan. In the Republic of Serbia, the preliminary flood risk assessment is prepared by the Ministry of Agriculture, Forestry and Water Management – Republic Water Directorate, in accordance with the Law on Waters, for a period of six years. This assessment must include floods caused by river overflow (external waters) and by excessive groundwater (internal waters). It is required to contain maps of the water area with topographic features, river basin and sub-basin boundaries, and land use patterns, a description of historical floods that significantly affected human life and health, the environment, economic activity, and cultural heritage, together with an assessment of the likelihood of similar events occurring again in the future, and an evaluation of the potential harmful effects of future floods, taking into account the location of watercourses, their hydrological and geomorphological features, the condition of flood defense structures, the location of settlements, and topographical characteristics ("Official Gazette of the RS," Nos. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018, Art. 45).

The key purpose of the preliminary flood risk assessment is to identify areas that are particularly exposed to flooding and in which the likelihood of severe, harmful consequences is increased. According to the 2019 assessment, which analyzed floods from 2012 to 2019, the number of identified significant flood-prone areas rose slightly compared with the 2012 assessment. While the earlier assessment identified 99 such areas, the later one identified 101 areas as being significantly threatened by flooding. These water areas

and significant flood-prone zones are presented on the map published by the Ministry of Agriculture, Forestry, and Water Management (Retrieved from the Ministry of Agriculture, Forestry, and Water Management website: https://www.rdvode.gov.rs/uredjenje-vodotoka.php).

2.2. The concept and types of floods in Serbia

According to Sekulić and colleagues, Southeastern Europe is regarded as a region particularly vulnerable to natural disasters, not only because of its geographical position and climatic characteristics, but also because of the unstable economic circumstances in many of its countries, which further intensify the effects of natural hazards. In the case of the Republic of Serbia, a long-standing exposure to the harmful effects of disasters is especially evident, and the country is particularly prone to floods (Sekulić, Dimović, Krnajski-Jović, & Todorović, 2012). Since the earliest stages of human settlement, floods have been among the greatest threats to people and the environment. Historically, communities were established near rivers because such locations offered fertile land and high agricultural productivity (Ćuzović, 2019, p. 22). However, as Ndini emphasizes, areas exposed to flooding are characterized by a dual reality: they offer substantial benefits but also involve considerable risk. This remains true today, although it is also clear that flood risk is continuously increasing, partly as a consequence of intensified climate change and partly due to human activities that alter natural conditions (Ndini, 2020, p. 53).

Floods have been defined in different ways in the literature. One definition describes a flood as a natural phenomenon involving an unusually high water level in rivers and lakes, resulting in water overflows from the river channel or lake basin that cross the banks and inundate adjacent land (Đorđević, 2017, p. 153). According to Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks, which has been incorporated into the Serbian Law on Waters, a flood is understood as the temporary covering of land that is not normally submerged by water. Such flooding may result from external or internal waters. At the same time, a flood area is defined as an area periodically inundated due to river overflow or excess internal waters ("Official Gazette of the RS," Nos. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018, Art. 3).

The causes of floods may vary considerably, but for analytical clarity, they are commonly divided into direct and indirect causes. Direct causes include precipitation in the form of rain or snow, ice formation on rivers, water-level conditions at the time of rising waters, channel meandering, landslides, and coincident high waters. Indirect causes include the size and shape of

the catchment area, the density of the river network, relief characteristics, soil saturation, the degree of afforestation and agricultural use in the basin, groundwater levels, fires that endanger flora and fauna, human influence, inadequate sediment removal from rivers, climate change, and insufficient embankment systems (Đorđević, 2017, pp. 154–155). Taken together, these causes show that floods are shaped not only by hydrological processes, but also by broader environmental and human factors.

For a better understanding of flood danger, it is also necessary to distinguish between different types of floods. Ndini notes that floods may be classified by their origin, the consequences they produce, the geography of the affected area, the underlying cause, or the speed at which they develop (Ndini, 2020, p. 54). Gavrilović and colleagues distinguish six main types of floods: floods caused by precipitation or snowmelt, floods caused by the coincidence of high waters, ice floods, torrential floods, floods caused by landslides, and floods caused by dam failure (Gavrilović, Milanović-Pešić, & Urošev, 2012, p. 108). In Serbia, the first two types occur most frequently, while ice floods were more common in the past, especially in the valleys of the Velika and Južna Morava rivers. Torrential floods are also relatively frequent, particularly in the basin of the Južna Morava, where they occur as a result of inadequate regulation of mountain watercourses. The last two categories are rare in Serbia, although historical cases show that they can cause catastrophic consequences when they do occur (Gavrilović, Milanović-Pešić, & Urošev, 2012: 108).

Floods can also be classified according to their frequency of occurrence. In that respect, they may be described as semi-annual, annual, hundred-year, thousand-year, and rare "mega" floods (Ćuzović, 2019: 23). In addition, Directive 2007/60/EC distinguishes floods of low probability or extreme events, floods of medium probability, and floods of high probability when flood hazard maps are being prepared. When the timing of flood wave formation is taken into account, floods may also be categorized as slow floods, which are typical of plains and generally require more than ten hours for the formation of a flood wave, torrential floods, which are characteristic of mountainous terrain and develop in less than ten hours, and accidental floods, which result from failures of water management or hydropower facilities and may develop almost instantaneously (Đorđević, 2017, p. 155).

Floods in the Republic of Serbia pose a potential threat to 1.6 million hectares of land, which amounts to 18% of the national territory (Gavrilović et al., 2012, p. 108). At the same time, 2.5 million inhabitants, or approximately 42% of the population, together with 32% of the country's GDP, are exposed to flood risk (Ćuzović, 2019, p. 25). The most endangered regions include Vojvodina, Posavina, and Pomoravlje, while the areas most often flooded

are located in the valleys of the Tisa, Sava, Velika Morava, and Danube rivers (Gavrilović et al., 2012, p. 108). Although floods may occur at any time of year, they are most common in Serbia in spring and autumn. In spring, a combination of rainfall and snowmelt in mountainous areas creates favorable conditions for flooding, as was the case in May 2014, while autumn is often marked by short but intense rainfall events that arise suddenly and produce flooding in riparian zones (Anđelković, Kovač, 2016, p. 23).

Serbia has had to contend with floods for many decades. One of the most significant floods of the twentieth century occurred in 1965, when the Danube overflowed and affected all river courses, inundating 150,000 hectares of land, destroying 16,000 houses, and damaging 214 kilometers of road infrastructure. In the twenty-first century, 2005 was marked by severe floods in Central Banat. The damage from these floods was estimated at 12.6 million euros, while an additional 3 million euros were spent on reconstruction and on improving flood protection systems (Nadlanu, 2014). Nevertheless, despite experience, Serbia was unprepared for the floods of May 2014, which remain remembered for their catastrophic impact. These floods are regarded as the most severe in the previous 120 years. A total of 1.6 million inhabitants were affected, more than two-thirds of municipalities experienced consequences, and the total financial damage was estimated at 1.7 billion euros (Bjelić & Lazarević, 2016, p. 6).

2.3. The impact of climate change on increasing flood risk at the local level

Climate change is increasingly recognized as one of the greatest threats to humanity in the twenty-first century, and such an assessment is well-founded. Rising average temperatures, expanding urbanization, the disappearance of agricultural land, glacier melt, sea-level rise, increasing ocean acidity, shifts in precipitation patterns, and growing threats to biodiversity all represent direct consequences of climate change whose effects have become more pronounced in recent years and have produced serious repercussions for both people and the environment (Milović, 2018).

To understand climate change more clearly, it is first necessary to consider the greenhouse effect. When solar energy reaches the Earth's surface, one portion is reflected toward the atmosphere. Greenhouse gases such as water vapor, carbon dioxide, and methane absorb and reflect part of this radiation, thereby warming the Earth's surface. Under natural conditions, this process is necessary for maintaining temperatures suitable for life. In practice, however, the ever-growing concentration of these gases in the atmosphere has led to rising global temperatures. This phenomenon is commonly described as global warming or climate change (Milović, 2018).

Among greenhouse gases, carbon dioxide has the strongest influence on temperature increase, and its concentration is directly associated with human activity. Over the last 250 years, the concentration of carbon dioxide in the atmosphere has risen by 35%, or approximately 100 ppm, while between 1995 and 2005 alone it increased by 19 ppm, which represents the highest recorded increase in such a short period. These alarming developments contributed to the organization of the 1992 Rio de Janeiro Summit, where the United Nations Framework Convention on Climate Change was adopted, thereby formally marking the beginning of a more coordinated global response to climate change (Sekulić et al., 2012, p. 14).

By 2015, the average global temperature had increased by 1.5°C, while the latest report of the Intergovernmental Panel on Climate Change indicates that temperatures may rise by as much as 4.5°C during the period from 2021 to 2050 (IPCC, 2022). Such warming affects both land and ocean surfaces. It accelerates water evaporation, which is then transported through the atmosphere and eventually returns to the ground as rain or snow (Trenberth, 2005). In this way, climatic changes directly affect the quantity and intensity of precipitation, thereby increasing flood risk (Milović, 2018). Although monitoring the precise impact of climate change on precipitation remains complex and regionally variable, current knowledge suggests that already dry regions will tend to become even drier due to reduced rainfall. In contrast, wet regions are likely to experience shorter but more intense rainfall events (Milović, 2018).

Researchers associated with the World Weather Attribution initiative have also examined the relationship between precipitation and flood occurrence, particularly in the context of how intensified climate change produces increasingly visible year-to-year differences in rainfall. Their research focused on Western Europe, including eastern France, western Germany, eastern Belgium, Luxembourg, and northern Switzerland. They concluded that rising temperatures increase the likelihood of catastrophic rainfall and that human activity is the principal driver of climate change that intensifies precipitation and creates favorable conditions for devastating floods (Mekgaret, 2021).

In response to these developments, many international organizations, institutions, regional bodies, and states have sought to identify ways of reducing the harmful consequences of climate change through panels, platforms, negotiations, and summits. In that context, the European Commission prepared a legislative proposal to reduce greenhouse gas emissions, with the overarching goal of achieving carbon neutrality by 2050. To pursue this goal, states are expected to prepare and adopt long-term greenhouse gas emission reduction strategies, such as Serbia's Low Carbon Development Strategy, as

well as medium-term greenhouse gas reduction plans known as Nationally Determined Contributions (Danas, 2022).

By ratifying the 2015 Paris Agreement, the Republic of Serbia assumed an obligation to prepare and submit these documents to the international community. However, Serbia has made only limited progress in this regard. Although a draft of the Low Carbon Development Strategy exists, it has not yet been formally submitted. The Nationally Determined Contribution was presented publicly in 2020, but likewise not submitted to the international community. At present, the principal normative documents regulating this field remain the Law on Climate Change and the Law on Energy (Danas, 2022).

2.4. Flood defense at the local level

Because the consequences of floods are so extensive and multidimensional, it is necessary to establish an adequate protection system against them. Effective flood defense requires institutional bodies responsible for disaster risk reduction and the coordination of response, recovery, and rehabilitation, as well as an appropriate legal and strategic framework comprising laws, strategies, plans, and decrees related to disaster risk reduction and flood protection. These formal elements must also be accompanied by practical implementation, public education, and continuous dissemination of information to the population if flood defense is to function effectively at all levels.

Contemporary flood defense is based on three basic principles. The first is sustainable development, which implies awareness that absolute protection against floods does not exist and that the focus must therefore shift toward understanding floods as a phenomenon with which societies must learn to live. The second is integration, meaning that structural and non-structural measures must be combined in order to provide an appropriate degree of protection. The third is coordination, which requires harmonized action among authorized bodies at the local, national, and international levels (Kljajić, Popović, & Grujić, 2016, p. 597).

According to the Law on Waters, flood defense refers to protection against high external and internal waters, as well as against ice accumulation. It may take the form of regular or extraordinary defense. The Law provides that flood defense is declared on a river section when the water level reaches elevations prescribed by the operational flood defense plan and a further rise in water level is expected, when the conditions for the formation, movement, and accumulation of ice meet the criteria prescribed by the operational plan, or when flood protection structures are endangered due to prolonged high

water levels. Flood defense may also be declared within a hydromelioration system when the conditions and criteria defined in the operational plan are fulfilled ("Official Gazette of the RS," Nos. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018, Art. 53).

In the Republic of Serbia, waters are classified into Class I and Class II categories. A special decision determines which class of waters include interstate waters. Flood protection structures on Class I waters are managed by the public water management company responsible for the relevant territory, while structures regulating watercourses on Class II waters are managed by the local self-government unit on whose territory they are located. In order to manage the risks arising from the harmful effects of water effectively, it is necessary to prepare a preliminary flood risk assessment, a general and operational flood defense plan, a flood risk management plan, and to implement regular and extraordinary flood defense measures, as well as erosion and torrent control ("Official Gazette of the RS," Nos. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018, Art. 45).

The General Flood Defense Plan is adopted for both Class I and Class II waters. It is prepared by the ministry responsible for water management and adopted by the Government for a period of six years. The Operational Plan is likewise adopted for Class I and Class II waters, as well as internal waters. The public water management company prepares it in accordance with the General Plan. It is adopted by the competent ministry no later than 31 December of the current year for the following year ("Official Gazette of the RS," Nos. 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018, Art. 55).

Regarding specific flood-protection activities, Kljajić and colleagues distinguish between structural and non-structural measures. Structural measures include both active and passive forms of protection. Active measures are aimed at reducing the adverse characteristics of high waters and addressing downstream problems along watercourses. These measures include the construction of reservoirs and retention basins, river regulation designed to increase discharge capacity, diversion channels, and catchment area regulation to ensure more even runoff. Passive measures are intended to prevent the direct overflow of high waters from river channels and include the construction of embankments, diversion channels, and protective walls that prevent water from entering protected areas.

By contrast, non-structural measures include preventive and operational actions, regulatory and institutional measures, solidarity-based measures, and information and education. Preventive and operational measures are directed at reducing the harmful effects of floods in all phases of defense and include the adoption of regulations and flood defense plans, as well as the forecasting of flood waves and the transmission of information to all relevant

levels. Regulatory and institutional measures consist of legal rules and decrees that define how flood-prone areas may be used. Solidarity measures are mechanisms aimed at reducing the negative effects of floods on social and economic systems during and after inundation. Information and education are also indispensable, as both the population and the personnel involved in flood defense must continually update and expand their knowledge in this field (Kljajić et al., 2016, pp. 594–595).

Protection against the harmful effects of water falls within the competencies of the Republic of Serbia, the autonomous provinces, local self-government, households, and the population more broadly. At the local level, self-governing units are obliged to adopt protection and rescue plans in accordance with the general and operational plans. However, several additional activities are particularly important for improving the protection of people and property and for strengthening local self-government's resilience to flood risk. One of these is land use management. Local communities are required to adopt valid planning and spatial planning documentation, since inappropriate land use in flood-prone areas significantly increases flood risk and the potential threat to people and the environment. To prepare such documentation properly, it is necessary to determine flood zones and potentially flood-prone zones within the community's broader zoning plans. It is also important to regulate the relocation of building and regulatory lines where technically feasible, and to define recommendations regarding the use of ground floors and basements, including prohibiting basement construction and specifying appropriate construction materials in flood-prone areas.

Another essential activity is flood preparedness, which includes implementing local preventive measures to reduce flood risk. Financing preparedness is equally important, since it provides the financial basis for reducing potential losses and protecting both individuals and communities. For example, insurance of buildings and property may represent one form of preparedness consistent with the principle of "living with floods." Raising public awareness about floods is also indispensable. This includes ensuring that information about flood risks, harmful consequences, evacuation procedures, first aid for affected persons, and related issues is widely available. It also implies the maximum possible use of media channels to inform as many people as possible about how to act before, during, and after floods (Stefanović, Gavrilović, & Bajčetić, 2014, pp. 57–58).

2.5. Consequences of floods and recovery at the local level

Because floods are both the most frequent and the most destructive natural hazard in the Republic of Serbia, they represent one of the greatest dan-

gers to human communities and have a particularly strong negative impact on the country's social and economic development.

The harmful effects and damage caused by floods may be classified in several ways. One common distinction is between material and non-material damage. Material damage includes losses that can be compensated, repaired, reconstructed, or replaced. In contrast, non-material damage refers to physically irreparable losses, such as human lives or parts of ecosystems whose usability has been destroyed by pollution (Messner & Meyer, 2006).

Another distinction concerns the difference between direct and indirect effects. Direct effects are those that arise from immediate contact between water and people, property, or the environment. These include fatalities, building damage, ecosystem destruction, livestock losses, contamination of agricultural land, and similar consequences. Indirect effects arise from floods' influence on broader social and economic processes. These include production interruptions due to building or facility damage, power outages and communication breakdowns, disruptions to the delivery of essential goods because of damaged transport infrastructure, and the inability to access public services such as health care and education (Messner & Meyer, 2006).

The floods of 2014 provide a particularly clear example of both direct and indirect consequences. They affected 1.6 million inhabitants, representing 22% of the population, while 51 people lost their lives. A total of 38 local self-government units suffered consequences, mainly in central and southern Serbia, and 32,000 people were evacuated. At the same time, serious indirect effects also emerged. Health institutions encountered difficulties because many of them suffered physical damage. At the same time, a large number of schools ceased functioning either because they were damaged or because they had to be used as temporary shelters for evacuated persons. An additional risk arose from the possible spillage of hazardous waste, as high groundwater levels threatened industrial zones. At the same time, large areas of agricultural land became unusable due to the deposition of harmful substances (Bjelić & Lazarević, 2016: 13). Although such consequences should ideally be prevented through adequate risk assessments and well-developed protection and rescue plans, where they nevertheless occur it is essential to have clear normative regulation and competent institutional bodies capable of coordinating recovery and assistance.

Following a natural disaster, the recovery and assistance process begins to restore normal life as quickly as possible. In the Republic of Serbia, the 2014 floods were followed by certain institutional and normative changes. An operational body of the Government, originally called the Office for Reconstruction and Assistance and today known as the Office for Public Investment Management, was established to perform professional and ad-

ministrative tasks related to assistance and post-disaster reconstruction. Its competences include coordinating the work of government bodies, donors, creditors, and other interested actors to support affected households and businesses (Bjelić & Lazarević, 2016, p. 15).

At the normative level, the Law on the Elimination of the Consequences of Floods in the Republic of Serbia was adopted, which has since been renamed the Law on Recovery after a Natural and Other Hazard. This law regulates the procedure of recovery and assistance provided to citizens and business entities that have suffered material damage as a consequence of a natural hazard (Vujičić, Maksimović, Stanimirović, 2020, p. 6).

The recovery and assistance procedure in the Republic of Serbia functions through several interconnected stages. Once a natural disaster has been declared, the Government adopts state recovery and assistance programs, after which local self-government units establish damage assessment commissions and issue public calls inviting citizens to report their losses. Once the reporting procedure has begun, the commissions assess and verify the damage. Local self-government units then conduct the procedure for determining entitlement to state aid and adopt decisions recognizing the right to such assistance. After the appeals procedure has been completed, state aid is paid to the affected parties. In cases involving the reconstruction of publicly owned facilities, the local self-government unit submits a request to the Office for Reconstruction and Assistance, and state recovery and assistance programs may also be applied to such facilities. The procedure differs somewhat depending on whether the matter involves new construction or rehabilitation. If a new facility has to be built, technical documentation must be prepared and location and construction permits obtained. In contrast, for rehabilitation, a permit to carry out works is required. The funds used for reconstruction and rehabilitation are secured from the Republic of Serbia's budget, donations, contributions, gifts, borrowing, and revenues from the sale of financial assets. At the same time, special importance is attached to financing transport infrastructure, public buildings, and facilities used for the production and distribution of electricity (Vujičić et al., 2020, p. 3).

3. Building local self-government resilience to flood risk

Resilience may be understood as the capacity of a system to absorb disturbance, respond to adverse conditions, and restore its key functions after disruption (Cutter et al., 2008). In the field of disaster studies, this concept is particularly relevant for analyzing local communities' ability to cope with flood hazards and recover from their consequences. For that reason, this chapter focuses on how local self-government units can enhance their re-

silience to flood risk and strengthen their institutional, social, and developmental capacities. A fundamental precondition for strengthening resilience is the existence of an adequate normative and institutional framework in disaster risk reduction, and its harmonization with international policy documents and strategic directions. In the Republic of Serbia, a major step in this regard was made in 2018 through the adoption of the Law on Disaster Risk Reduction and Emergency Management, which is aligned with the priorities of the Sendai Framework and places special emphasis on strengthening the role of local self-government in disaster risk reduction (Official Gazette of the Republic of Serbia, No. 87/2018). The adoption of this law represented an important shift from a predominantly reactive approach toward a more preventive and integrated understanding of disaster management. It also created a clearer legal basis for defining the obligations of local authorities in relation to preparedness, prevention, response, and recovery.

At the same time, the Law on Waters is also of considerable importance because it regulates flood-related issues in more detail, including the definition of institutional responsibilities and the organization of flood protection measures. In addition, this law prescribes the adoption of the Water Management Strategy for the Territory of the Republic of Serbia as one of the key planning documents in this area. Alongside these legal and strategic acts, it is also necessary to highlight the National Programme for Disaster Risk Management, which was adopted after the 2014 floods to improve the mobilization, distribution, and coordination of financial and institutional resources for more effective disaster risk management (Official Gazette of the Republic of Serbia, Nos. 30/2010, 93/2012, 101/2016, 95/2018, 95/2018; National Programme for Disaster Risk Management, 2014). Together, these documents form the basis of Serbia's normative framework for flood risk reduction and indicate that resilience cannot be strengthened without clearly defined responsibilities, long-term planning, and coordinated action.

In addition to the official documents that govern the role of local self-government in reducing flood risk, academic literature has developed approaches to assess community resilience across different forms of capital. This perspective includes natural, economic, physical, human, and social or institutional capital, all of which are essential for decreasing vulnerability and improving preparedness for future flood events (Mayunga, 2007). Such an approach makes it possible to understand resilience as a multidimensional phenomenon, rather than reducing it solely to legal capacity or physical protection. Therefore, this chapter aims to demonstrate that the resilience of local self-government units to flood risk in the Republic of Serbia can be strengthened not only through laws and strategies, which provide the formal framework, but also through the development of different forms of cap-

ital that directly shape the actual capacities of communities (Mayunga, 2007; Anđelković & Kovač, 2016).

3.1. Normative and legal foundations of local self-government resilience to flood risk

When international standards in disaster risk reduction, climate-related recommendations, and the experience of catastrophic events such as the 2014 floods are taken into account, it becomes evident that Serbia's adoption of the Law on Disaster Risk Reduction and Emergency Management in 2018 marked a major step toward strengthening resilience to flood risk (Official Gazette of the Republic of Serbia, No. 87/2018). This law introduced a more comprehensive legal basis for disaster governance. It emphasized that risk reduction must be approached as a continuous, planned process rather than as a response limited to emergencies. It also confirmed that local self-government units have a central role in translating national policies into concrete local action.

The law establishes the general principles governing disaster risk reduction and emergency management and explicitly identifies these matters as priorities at the local level. In addition, it recognizes local communities as key actors in implementing disaster risk management measures. According to Article 29, local self-government units are responsible for preparing risk assessments, drafting local disaster risk reduction plans and protection and rescue plans, organizing and establishing civil protection systems within their territory, forming emergency management headquarters, planning and securing budgetary resources, identifying business entities of special importance for protection and rescue, establishing civil protection units, and carrying out all necessary preventive and urgent measures aimed at reducing disaster risk (Official Gazette of the Republic of Serbia, No. 87/2018). Through these obligations, local self-government is positioned not merely as an administrative level, but as a crucial operational and strategic actor in the management of flood risk. This is especially important because the effectiveness of local action often determines the scope and severity of disaster consequences.

A more detailed regulation of water-related activities, including water management and flood protection, is provided by the Law on Waters. Integrated water management in Serbia falls under the jurisdiction of the Republic of Serbia. It is implemented through the ministry responsible for water management, the authorities of the autonomous province, local self-government units, and public water management enterprises. In order to ensure adequate flood risk management and protection from the harmful effects of

water, and in accordance with broader international approaches, the Law prescribes the adoption of preliminary flood risk assessments, flood risk management plans, general and operational flood defense plans, regular and emergency flood protection measures, as well as erosion and torrent control measures. One of the especially important obligations of local self-government in this field is the identification and designation of flood-prone zones within its territory so that adequate preventive action may be undertaken promptly. Furthermore, Article 29 of the Law defines water management planning documents, among which the Water Management Strategy for the Territory of the Republic of Serbia holds the most important place (Official Gazette of the Republic of Serbia, Nos. 30/2010, 93/2012, 101/2016, 95/2018, 95/2018). This confirms that flood resilience depends not only on emergency response capacity, but also on the quality of long-term planning and governance in the water sector.

The Water Management Strategy for the Territory of the Republic of Serbia until 2034, adopted in 2017, is a long-term planning document that determines the strategic direction of water management in the country. To be effective, it must be harmonized with other legal, strategic, and planning documents in related fields, especially spatial planning, environmental protection, and sustainable development. Based on this strategy, numerous activities are implemented in the water sector to improve the overall system and strengthen institutional and professional capacities at the national, regional, and local levels. The Strategy is adopted by the Government, upon the proposal of the competent ministry, for a period of ten years. It is reviewed every six years, as necessary, revised, or supplemented to improve water governance. During the drafting process, it is necessary to determine the existing state of water management, define its objectives and guidelines, project its future development, and identify the measures required to achieve the established goals (Official Gazette of the Republic of Serbia, Nos. 30/2010, 93/2012, 101/2016, 95/2018, 95/2018). This strategic orientation is important because it connects flood protection to broader development priorities and demonstrates that water governance is not solely a technical issue but also one of institutional coordination and sustainability.

Alongside these legal and strategic documents, which provide the basis for a systematic approach to prevention and risk management, it is also necessary to mention the National Programme for Disaster Risk Management, adopted in 2014 after the devastating floods that affected Serbia. Its main purpose is to strengthen resilience at all levels through appropriate coordination, targeted allocation of resources, and the implementation of activities aimed at reducing disaster risk and improving emergency management. The Programme is structured around six major components implemented through annual plans: institution building, risk identification and monitor-

ing, structural and non-structural risk reduction measures, early warning and preparedness, risk financing, and efficient recovery and reconstruction (National Programme for Disaster Risk Management, 2014). The importance of this Programme lies in the fact that it links prevention, preparedness, response, and recovery into a single policy framework, thereby providing the broader national context within which local self-government units can shape their own resilience-building measures.

3.2. Natural capital as a basis for flood resilience

To assess the resilience of local communities, a framework based on different forms of capital has been adopted. From this perspective, capital represents a community's ability to absorb the impacts of disasters, respond effectively, mitigate their consequences, and strengthen long-term resilience. From this perspective, resilience may be analyzed in terms of natural, economic, physical, human, social, and institutional capital (Mayunga, 2007). This model is particularly useful because it broadens the understanding of resilience beyond institutions and infrastructure, enabling observation of how different community resources interact during crises. It also highlights the fact that vulnerability is usually the result of several interconnected weaknesses rather than a single deficiency.

Natural capital includes resources such as arable land, meadows, forests, biodiversity, minerals, oil, and water, whose availability, quality, and structure strongly influence both a community's vulnerability to disasters and its overall potential for sustainable development. These resources may be grouped into two broad categories. The first includes basic resources essential for life and the functioning of ecosystems, such as land, surface and groundwater, oceans, and the atmosphere. The second comprises resources necessary for the development of culture and civilization, namely those whose exploitation and processing provide the material basis for human life, such as timber, metals, non-metals, and energy resources (Aktiviranje kapitala zajednice u svrhu vitalnog lokalnog razvoja, 2017). The condition of these resources affects not only the environmental quality of an area, but also its social stability and economic security. Therefore, natural capital should be viewed as one of the central pillars of resilience rather than as a passive environmental background.

In strengthening local resilience to floods, preserving and improving natural capital is particularly significant. Vegetation can help reduce the risk of excessive overflow in riparian areas, while forest cover may lessen erosion and contribute to greater environmental stability. Research conducted by Anđelković and Kovač shows that natural capital in Serbia is relative-

ly weak, particularly regarding agricultural land, which is among the first resources affected during floods. At the same time, agriculture itself is directly endangered. In addition, human activity, industrial development, and the intensification of the greenhouse effect represent serious pressures on natural capital (Anđelković & Kovač, 2016). This indicates that resilience to floods cannot be strengthened solely through technical or engineering measures, but must also include environmental preservation and more responsible management of natural resources.

3.3. Economic capital and the capacity for recovery

Economic stability is one of the most important indicators of a country's condition and the quality of life of its population. A stronger and more stable economy generally contributes to higher resilience to floods, whereas economic decline is commonly associated with greater vulnerability. Research conducted in Serbia has shown that economically stronger local self-government units, characterized by a higher number of business entities, stronger employment, and higher gross product, tend to recover more rapidly from disasters and possess greater capacity to cope with the consequences of floods (Anđelković & Kovač, 2016). Economic strength enables local communities to mobilize resources faster, invest more in prevention, and reduce their dependence on external assistance during recovery. In that sense, economic capital functions not only as a background condition but as an active factor in resilience-building.

According to Al-Maruf, financial capital can directly reduce local vulnerability to floods through mechanisms such as insurance schemes and the construction of safer residential and commercial facilities. Investment in financial capital at different stages of recovery can also improve community infrastructure by supporting the construction or rehabilitation of roads, bridges, and embankments, while strengthening human capital through expenditures in education and health care. Financial capital may further contribute to resilience through access to financial services, including microfinance, and through support for small and medium-sized enterprises during periods of social and economic disruption. Previous studies have suggested that economic or financial capital may be measured through indicators such as household income, property value, employment, investment, average wages, the number of companies operating within a local community, loans, and related variables. Strengthening economic capital, therefore, enhances the capacity of individuals, groups, and communities not only to absorb the impacts of disasters but also to adapt more effectively and recover more quickly (Al-Maruf, 2017). Communities with stronger economic resources

are typically better positioned to implement both preventive and post-disaster measures.

As emphasized by Anđelković and Kovač, one of the most important directions for improving economic capital is to educate companies on preventive and reactive disaster protection measures and to raise awareness of the importance of property insurance, particularly in municipalities such as Smederevska Palanka and Loznica, where flood vulnerability is especially pronounced. In contrast to economically stronger municipalities such as Kladovo and Obrenovac, less resilient municipalities such as Mali Zvornik and Negotin remain much more dependent on external assistance and donations (Anđelković & Kovač, 2016). This difference clearly illustrates that disparities in local development are directly reflected in unequal disaster recovery capacities. For that reason, any long-term resilience policy should also include measures to reduce local economic inequalities and strengthen local development potential.

3.4. Physical capital and critical infrastructure

Physical capital includes essential infrastructure such as transport systems, shelters, communication networks, water supply systems, health institutions, and markets, as well as production equipment and other tangible assets that help people maintain safety and a certain level of well-being. It is one of the most important resources available to communities because it provides households and groups with the material basis necessary for survival and recovery during and after both natural and human-induced disasters. However, access to physical capital is not distributed equally, especially in poorer rural communities, so not all communities are in a position to control the physical resources available to them directly (Al-Maruf, 2017). Unequal access to infrastructure often results in unequal exposure to disaster impacts, which is why the quality and accessibility of physical capital must be regarded as fundamental dimensions of local resilience.

There is no doubt that critical facilities and infrastructure play a decisive role in ensuring access to resources and support during crises. Conversely, the absence of physical infrastructure or critical facilities can significantly weaken households' and communities' capacity to cope with disasters (Al-Maruf, 2017). For this reason, physical capital may be assessed based on access to educational institutions, housing, mass media such as television, newspapers, and computers, the quality of water supply and sewage systems, distance from regional centers, and the level of road infrastructure development (Anđelković & Kovač, 2016). These indicators show that physical resilience depends not only on major infrastructure, but also on the availa-

bility of everyday services and facilities that become critically important in emergencies.

To improve physical capital in municipalities across the Republic of Serbia, it is necessary to plan the efficient use of available facilities that could serve as emergency reception centers. In contrast, continuous investment in road infrastructure can improve connectivity and facilitate the delivery of assistance during disasters (Anđelković & Kovač, 2016). Additional attention should also be given to maintaining and modernizing infrastructure in areas exposed to repeated flooding, because without sustained investment, even previously adequate infrastructure may become a source of vulnerability rather than protection.

3.5. Human capital and community adaptive potential

Human capital is generally understood as the stock of knowledge, skills, and abilities possessed by the labor force. Historically, this concept was first used to support the view that a country could achieve economic growth if its workforce became larger, healthier, and better educated, even without a simultaneous increase in physical capital (Husted et al., 2022). Over time, however, the concept has taken on broader significance and has become highly relevant in disaster studies. Today, human capital is increasingly recognized as a key determinant of a community's ability to prepare for, respond to, and recover from disasters.

From a disaster resilience perspective, people represent the greatest potential to strengthen local community resilience. Human capital may therefore be understood as the development of population capacities through formal and informal education, as well as through the acquisition of practical skills that indirectly reinforce other forms of capital. In addition, experience gained from previous flood events enables people to accumulate knowledge, refine their response patterns, and strengthen local adaptive capacities (Al-Maruf, 2017; Husted et al., 2022). In that sense, human capital operates both as a direct and an indirect resource for resilience, shaping not only individual preparedness but also the community's collective ability to learn, organize, and adapt over time.

In Serbia, a large share of older adults, children, ill persons, and social welfare beneficiaries contributes to greater vulnerability during disasters, complicating responses and necessitating the inclusion of these groups more systematically in local disaster risk reduction plans. Research has also shown that insufficient protective measures and the absence of economic support for welfare recipients contribute to the growth of poverty during emergen-

cies in municipalities such as Nova Crnja and Mali Zvornik. For this reason, measures aimed at protecting social welfare beneficiaries should be incorporated into local response and recovery policies (Anđelković & Kovač, 2016). This issue is especially important because disaster vulnerability is not distributed equally across the population. A resilience-oriented policy must therefore devote particular attention to those groups whose capacities for self-protection are more limited.

A useful example of good practice in the integration of disaster risk reduction into education can be found in Armenia, where a programme was implemented within the framework of the European Commission Humanitarian Aid Department's Disaster Preparedness Programme, in cooperation with UNICEF, UNDP, Save the Children, Oxfam, and the Armenian Red Cross Society. The purpose of the programme was to provide disaster risk reduction education, strengthen institutional capacities, improve the technical preparedness of emergency management bodies, and include children with disabilities in the national disaster risk reduction strategy. Among the concrete measures introduced were a new warning system for persons with visual or hearing impairments, special fire safety measures, and adapted elevators for wheelchair users (Palonka & Evidente, 2022). Such examples demonstrate that human capital can be strengthened most effectively when education, inclusion, and practical preparedness are approached in an integrated manner. They also confirm that resilience-building measures should be adapted to the needs of different social groups.

3.6. Social and institutional capital in local flood risk reduction

When discussing communities in hazard-prone areas, especially those exposed to flooding, it is necessary to focus not only on structural measures but also on non-structural approaches to disaster risk reduction. In this context, the social dimension of a community becomes one of the most important elements of disaster management at the local self-government level. It is evident that social capital plays a major role in different phases of the disaster risk management cycle, both before and after disasters, and may therefore be used as an important collective resource for strengthening local resilience (Sanyala & Routray, 2016). Strong communities are defined not only by their infrastructure and institutions, but also by the quality of relationships among their members. For that reason, social ties should be understood as a practical resource in times of crisis rather than merely as a background social characteristic.

One definition of social capital presents it as a feature of social organization that includes networks, norms, and trust. At the same time, in the

context of community resilience, it reflects the quality and scope of social cooperation. Drawing on previous disaster experience, some authors argue that the most resilient communities are precisely those that can mobilize all available capacities and unite around a common goal (Mayunga, 2007, p. 7). This interpretation makes it clear that resilience is not exclusively technical or institutional, but also deeply relational and collective. Communities characterized by stronger cooperation and trust are usually better prepared to respond to disruptive events and recover more effectively from their consequences.

Among the most important determinants of resistance and response to natural disasters is the social dimension itself, including population cohesion, the quality of interpersonal relations, information exchange, and mutual trust (UNDP). Indicators of social capital used in measuring community resilience include political participation at the municipal level, the number of telephone subscribers, the number of school dropouts, and the level of computer literacy (Anđelković i Kovač, 2016, p. 64). These indicators show that social capital may be observed through both formal participation and everyday capacities for communication, inclusion, and access to information. In practical terms, this means that resilience depends as much on social connectivity as on formal institutional preparedness.

Research in the field of disasters has produced strong evidence regarding the importance of social cohesion during and after disasters, demonstrating that social networks provide not only financial assistance, such as loans and gifts for repairing damaged property, but also non-financial support, including search and rescue, debris removal, childcare during recovery, emotional support, shelter, and information. In contrast, isolated individuals with few social ties are less likely to receive first aid or support during evacuation and sheltering (Aldrich & Meyer, 2014, p. 3). This confirms that social isolation may substantially deepen disaster vulnerability. It also explains why the strengthening of local social ties should be regarded as an important element of flood risk reduction policy.

In the Republic of Serbia, the principal indicator of social and institutional capital is citizens' participation in political decision-making. Thus, in cities such as Šid, Novi Pazar, Smederevska Palanka, Kragujevac, and Kraljevo, where political engagement among citizens is relatively high, residents may advocate for the inclusion of informal groups within the local disaster risk reduction system. By contrast, in municipalities with low political participation, cooperation between citizens and local self-government tends to remain confined to the formal disaster risk reduction framework. The development of local policies and procedures for disaster risk reduction should therefore be based on the inclusion of vulnerable groups for the purpose of strength-

ening their resilience in emergencies, the education of children and youth at all levels of schooling, and the adequate use of social networks for disseminating information on prevention measures, protection, and response in disaster situations (Anđelković i Kovač, 2016, p. 101). In that respect, institutional openness and citizen participation should be understood as mutually reinforcing components of resilience. The stronger the cooperation between institutions and the community, the greater the likelihood of effective disaster risk reduction and successful recovery.

4. Conclusion

Undoubtedly, natural hazards are among the greatest threats facing humanity in the twenty-first century. Owing to their characteristics, such as sudden onset and intensity, they continuously pose a threat not only to human life and health, but also to critical infrastructure and the environment. The region of Southeastern Europe, due to its geographical position and climatic characteristics, is known to be highly susceptible to natural hazards. At the same time, the Republic of Serbia, in particular, has long been marked by floods. This phenomenon has always accompanied it and continues to pose a major threat to protected values.

Although floods have long been an integral part of human life and were even explained as an "act of God," in recent decades, their frequency, intensity, and speed of onset have changed significantly, and we are witnessing increasingly frequent and destructive flood events with clearly identifiable causes. One of those causes is certainly ongoing climate change, the rapid intensification of which is driven by human activity and harmful impacts on nature. This results in ozone depletion, an increase in average annual temperatures, the destruction of biodiversity, an increase in precipitation, and similar processes, all of which together create favorable conditions for floods.

Efforts to align legal and strategic documentation with the recommendations and regulations of international organizations in the field of disaster risk reduction and emergency management, together with the timely and adequate implementation of preventive activities such as hazard-source mapping, monitoring, and risk assessment, respect for urban planning regulations and land management to avoid constructing houses and other facilities in flood-prone areas, as well as the provision of financial resources for maintaining protection systems, are essential measures for ensuring the proper functioning of the risk reduction system and strengthening resilience at the local, national, and regional levels.

After the 2014 floods, which caused catastrophic consequences and revealed numerous shortcomings and weaknesses in the risk reduction system, the key role of local self-government in risk management was recognized. Accordingly, local self-government has a primary role in undertaking both preventive and reactive measures in addressing flood risk within the territory of the local self-government unit. In the context of risk reduction, local self-government is obliged to adopt a risk assessment, designate flood-prone zones within its territory, implement flood defense plans, establish civil protection units, and organize fire and rescue units in order to ensure a more effective response in the event of floods and to reduce and eliminate their consequences.

In addition to specific normative and planning measures aimed at building resilience at the local level, an unavoidable new concept of resilience assessment is the capital-based approach—natural, physical, economic, human, and social and institutional capital—through which capacities for response to and recovery from floods are strengthened at both the local and national levels. Based on measuring the resilience capital index, that is, by analyzing each form of capital and its indicators, it is possible to determine the degree of resilience of a particular local self-government unit, while also identifying the need to improve certain capacities and resources in order to provide more adequate protection and response in the event of natural disasters.

Within the context of capital, in addition to infrastructure improvement, afforestation, and economic stability, the importance of human and social capital in disaster risk reduction has also been recognized. The main means of combating disasters lies in building the resilience of people, that is, members of the community, and equipping them to understand risk, undertake proactive measures, respond promptly, and adapt to the consequences. None of this can be achieved without non-formal educational programs that teach the local population how to act before, during, and after a disaster. This form of education not only benefits each individual but also strengthens the cohesion of a local community to confront change collectively and, in that way, supports competent services in eliminating consequences and restoring normal life.

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