

Social Awareness on Floods and its Management

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Abstract

Damages and losses caused by floods have been on the rise in Upper Vardar River Basin (Polog Region) over the past few years. The entire river basin experiences dramatic variations in water flows over time, and the risk of floods is also exacerbated by the basin's mountainous topography and land structure. Human factors are also at work. Changing land use and land cover – for example, through cultivation or construction in high-risk zones, rapid urbanization and heightened erosion from logging in forests – are altering hydrological regimes, increasing the risk of floods. Other causes include incomplete, poorly maintained, decaying or inappropriately used flood control infrastructure.

The tragic consequences of the most recent extreme flood events, and the magnitude of associated damages and losses, revealed major deficiencies throughout all components of the overall flood management system (e.g., monitoring, planning, response and recovery). On 3 August 2015, after torrential rains lasting less than two hours, the region was hit by a combination of flash floods, torrential streams and landslides that caused six deaths and an estimated USD 21.5 million in damage (based on a UNDP-backed assessment carried out the for most affected parts of the basin). The Pena River inundated the center of the City of Tetovo and submerged many agricultural fields in nearby areas. The regional road from Tetovo to the Kosovo border was blocked by sludge that in places reached four meters high; and parts of the mountainside village of Sipkovic were buried in mud, boulders and rubble

For this purpose a baseline survey is going to prepare to identify people's and communities' perception of flood and other risks, current willingness-to-accept certain risks and willingness-to-pay to mitigates risk to acceptable levels similar survey is planned for the end of the Programme, to detect likely changes in perception following a period of intensive community awareness programmes and campaigns.

1. Introduction

Floods are associated with extreme precipitation events and have a significant influence on society (Lenderink & van Meijgaard 2008, Lenderink G, van Meijgaard E. 2008). Flood events are now reported more than ever before due to the increasing spread of human settlement and development activities in urbanized areas. The changes in climate and hydrologic flood patterns in Europe and in Western Balkans clearly indicate that there is a growing need to assess the impact of precipitation extremes on flood risk. Republic of Macedonia is no exception from these trends, the country is exposed to various types of natural hazards, including floods. The country is exposed to climate change and its consequences, of all 28 Europe and Central Asia (ECA) countries studied as part of the World Bank Study. Adapting to Climate Change in Eastern and Central Europe (2009) only three countries in the region have experienced more climate related natural disasters between 1990 and 2008. The country was ranked twelfth among ECA countries in terms of overall to disaster risks and their impact on the development and prosperity of the country and its citizens.

Floods have been one of the most important natural hazards in Macedonia the last decade, causing loss of life, displacement of people, and economic losses. Risk is defined as the probability that a particular level of loss will be sustained by a given series of elements as a result of a given level of hazard impact (Alexander 2000 Alexander D. 2000). Risk=Hazard x Vulnerability

The concept of vulnerability is commonly used within disaster research. Multiple definitions and different conceptual frameworks of vulnerability exist because several groups have different views about vulnerability. Vulnerability captures the conditions of an object of observation that characterize disadvantages in the face of natural hazards (Fekete 2009a Fekete A. 2009a). Vulnerability is affected by physical, economic, environmental, and social factors (Westen&Kingma 2009 Westen CV, Kingma N. 2009).

Social vulnerability refers to 'the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, or recover from the impact of a hazard' (Cutter et al. 2003 Cutter SL, Boruff BJ, Shirley WL. 2003). The assessment of social vulnerability includes various factors or characteristics, such as age, gender, race, overcrowding, ethnicity, social class, unemployment rate, immigrant status, density and quality of the built environment, land use, housing tenancy, and the presence of informal support networks (Cutter et al. 2000 Cutter SL, Mitchell JT, Scott MS. 2000).

The majority of studies provide a map representing the spatial variability of social vulnerability (Cutter et al. 2000 Cutter SL, Mitchell JT, Scott MS. 2000). Social vulnerability maps allow for the representation of anticipated community needs at differing levels of disaster response (Morrow 1999 Morrow BH. 1999). This study is no exception.

Some of the most commonly referenced vulnerability characteristics are summarized in the table below.

Table 1 Vulnerability characteristic

| Vulnerability Factor | During Event | Recovery |
|-----------------------------------|---|--|
| Low income/ | Poverty Level Lack of resources may complicate evacuation | Lack of resources may hinder ability to recover |
| Elderly/Very Young | Greater difficulties in evacuation, more health and safety issues, potential for higher loss of life | May lack resources, willingness, ability to rebound |
| Disabled | Greater difficulties in evacuation, special health and safety issues, potential for higher loss of life | Lack of facilities and medical personnel in aftermath may make it difficult to return |
| Female-headed Households | Lack of resources and special needs may complicate evacuation | Lack of resources may hinder ability to recover |
| Minorities | Lack of influence to protect interests; lack of connections to centers of power or influence | Lack of influence to protect interests; lack of connections to centers of power or influence |
| Occupants of Mobile Homes/ | Renters Occupy more vulnerable housing | Potential displacement with higher rents |
| Transient/Homeless; | Difficult to locate and provide information to | Difficult to estimate numbers |

(Source: Dunning and Durden, 2011, p. 8.)

The study aims to map vulnerability groups and assess their vulnerability according to variables developed by Dunning and Durden in the upper Vardar river basin. The main goal of this research is to collect data for the needs of the expert team working on the preparation of the "Flood Risk Management Plan in the upper Basin of the Vardar River (Polog Region)", in accordance with the concept and objectives of the Floods Directive of the European Union. This project will provide a level of detail that will be sufficient to select an optimized flood risk mitigation strategy in the future and will be one of the basic documents for planning future activities.

2. Legal and Policy Framework on Flood Risk Management

Overview of national legislation

The core national legal instrument that encompasses among others floods is the *Law on Environment*. It incorporates the basic principles and procedures of environmental management. The Law, in its chapter on *Sustainable development and global issues in the area of environment*, contains provisions to establish a national system aiming at stabilization of greenhouse gases (GHG) concentrations in the atmosphere, preventing dangerous anthropogenic interference with the climate system, and mitigating the effects of climate change. Article 187 requires preparation and adoption of a National Plan on Climate Change. The main elements of the Plan, *inter alia*, among others include:

- vulnerability assessments in several sectors and measures of adaptation;
- mitigation analyses;
- information and cartographical presentation of monitoring, research and systematic observation of climate change; action plan and measures for mitigation of climate change;
- economic analysis of the proposed measures for climate change prevention and mitigation;
- bodies, institutions and other legal entities responsible for implementation of the national plan, action plan and measures for climate change prevention and mitigation;
- description of activities of public awareness raising, education and professional training of the scientific, technical and management staff and results achieved.

The law also provides for implementation of CC-related actions by the LSG units, including the implementation of the principles of sustainable development, adoption of a Local Environmental Action Plan, submission of monitoring data from local monitoring network, as well as data required for the maintenance of the respective cadastres, submitting relevant data to the elaboration of the project environmental impact assessment study and access to environmental information possessed thereby, implementing Strategic Environmental impact Assessments.

Other national legislation

In Macedonia, there are a number of sector laws regulating issues relevant for the floods. A brief overview is provided in this section. Institutional arrangements for implementation of the laws are elaborated in Chapter 4 of this document.

Law on Protection and Rescue (Official Gazette of the Republic of Macedonia 93/2012,41/2014,129/2015,106/2016)

regulates system of protection and rescue among others against floods, and encompasses monitoring, measures, reporting, training, mobilization, first aid protection and assessment of the risk as well as data base of the sources of the risks. Article 67 of the Law defines and regulates specifically protection against the floods, Accordingly, protection against the floods includes regulation of waterways, construction of protective structures, maintenance and repair of damaged parts of protective structures, observation and reconnaissance of the conditions of the watercourses and high dams, the protective facilities and the surrounding area, marking the height of the waveforms on a wave span, in a timely manner reporting and alarming of the population in the endangered area, implementation of the evacuation of the population and material goods from the endangered area security the passage and transportation through water, saving the endangered people on water and under water etc.

Law on Crisis Management (Official Gazette of the Republic of Macedonia no.07/2005, 41/2014, 104/2015)-

regulates organization and functioning, decision making and use of resources, communication, coordination and cooperation, risk assessment and other issues related to crisis management.

The Law on Spatial and Urban Planning (Official Gazette of Republic of Macedonia 60/2011)

regulates the planning of the space, defining the types and contents of plans, as well as specification of the procedure for their adoption. According to the Law, there must be a Spatial Plan of the Republic of Macedonia and regulations for its enforcement, as well as spatial plans of region, national park, area of the City of Skopje and municipalities. Adoption of spatial plans is compulsory. Urban plans are adopted at the local level as follows: General Urban Plan (GUP), Detailed Urban Plan (DUP), Urban Plan for Villages (UPV); Urban Plan Outside of Populated Places (UPOPP); Local urban planning documentation; Architectural urban planning project. These are management documents, and present integrated development projects by means of which, space organization is defined for a particular territory. They set the goals, concepts and conditions for implementation of spatial development in various areas, and also establish principles for public participation.

Law on Waste Management (Official Gazette No. 68/2004, 71/2004, 107/2007, 102/2008, 143/2008, 82/2009,

124/2010, 51/2011, 123/2012) establishes the general legal framework for waste management, plans and programs, rights and obligations of the legal and natural entities. There are number of competences for LSG concerning planning and enforcement of waste management system which are directly related to climate change. Key among these is the management of landfills. Issues of waste collection, segregation, sorting, recycling are also important for climate change.

Law on waters (Official Gazette 87/08; 6/09; 161/09; 83/10 51/11 44/12)

determines the conditions and the manner of use, protection and control of pollution of the waters, as well protection against adverse effects of waters (management in cases of droughts, erosion, flooding). According to this law, the LSGUs are in charge of the local monitoring network and are thus obliged to provide hydrological data to the central government, to plan and conduct activities for protection from adverse effects of waters for the urban area, and plan and carry out public water supply and urban wastewater treatment system for the urban areas.

Law on nature protection (Official Gazette no. 67/2004, 14/2006, 84/2007, 35/2010, 47/2011, 148/2011,

59/2012) refers to the protection of biological diversity, landscape diversity, and of the natural heritage, whether inside or outside protected areas. The LSGUs are not envisaged as competent authorities for the implementation of this law. The

determination and monitoring of the state of nature, biodiversity and landscape diversity; its conservation and restoration to the status of a natural balance; the nature management of a system is established on a central level. The LSGUs do not have a prominent role, mainly included in the work of the management bodies of certain categories of protected areas – for instance, the municipality of Resen is the management authority for Ezerani PA and the Prespa Lake.

Macedonia's Environmental and sectoral strategies

Several important policy/strategic documents encompassing directly or indirectly flood and protection and rescue.

1. **National Strategy for protection and rescue for 2014-2018**, identifies priorities for protection and rescue. Among others pledges for implementation of measures against floods and natural waterfalls, rescue and protection from floods from demolition of dams and artificial reservoirs.
2. **The National Environmental Investment Strategy for the period 2009-2013**, based on priorities identified in the national strategic documents for: necessary funds; the allocation of the obtained funds; institutional strengthening to ensure efficient and effective implementation to implement the Strategy. The Strategy suggests establishing an inter-ministerial task force to address the current lack of coordination and to streamline investment activities.
3. **The Plan for Institutional Development of the National and Local Environmental Management Capacity for the Period 2009-2014** determines the relevant functions and suggests mid-term institutional development measures for central administrative bodies and bodies of the local self-government having competences in the area of environment. It identifies priorities and measures to facilitate the process of transfer of competences from central to local level, to increase the implementation capacity of the local self-government units, as well as to foster the development of strong connections between central government and LSGUs in the area of environment. Focused on establishing proper decentralized environmental management system, it does not directly or exclusively deal with CC governance and local action. Importantly, however, the plan notes that the structure present at the time of preparation of the Report (2008), i.e. the appointment of a state councilor for climate change and other administrative provisions, as well as the grouping of functions, is good, as the issues of climate change are directly connected to the Department for IPPC (as industrial emissions are the top contributor to climate change).
4. **National Strategy for Sustainable Development (NSSD), adopted in 2010 for the period 2010-2030**, aims at setting a vision, mission and objectives for economically, socially and environmentally balanced development by 2030.

There are also several sector strategies focusing on particular environmental areas or media such as:

Water Management Strategy, Waste Management Strategy (2008); National Waste Management Plan (2008), National environmental action plan, National environmental health plan.

Institutional framework

Basically, the institutional and legal framework for governance in this area in Macedonia is structured along the lines of the traditional fields of interest, i.e.:

- Protection & Rescue; crisis management
- Environment
- Spatial & Urban Planning
- Waste management
- Water management
- Nature Protection
- Agriculture & Forestry

Each of these fields relates to protection.

Protection and Rescue; Crisis Management

Climate-related disasters already account for the majority of urban disasters in the global level. As a result there is long experience in disaster response. This raises the urgency for national and LSG units in Macedonia to strengthen capacity in the areas of emergency planning and disaster preparation.

Protection and rescue is the joint responsibility of the state administration bodies, municipalities, public enterprises, NGO etc. Policies are set at the central level, in the form of the National Strategy for Protection and Rescue which covers the organization of activities and procedures for preventive and operative measures in the area of rescue and protection. The Directorate for Protection and Rescue is the focal institution for coordinating efforts in the sector. The Directorate has 35 de-concentrated branches in order to facilitate the coordination and cooperative arrangements with the LSG units¹, which in turn focus mainly on policy and institutional alignment to the national directives in the sector.

The crisis management system encompasses information, assessment and analysis of the situation, development and implementation of the activities for prevention early warning and crisis management. Crisis management system is joint responsibility state administration bodies, the government, armed forces, forces for protection and rescue and the LSG units (municipalities and City of Skopje). This system is managed by the Centre for Crisis Management, which ensures continuity of inter-sectoral and international cooperation, coordination and consultation and coordination in crisis management, preparation and updating of risk assessments, as well as proposing measures and activities for resolution of crisis situations². The Crisis Management Center develops guidelines for Preparation of the National Crisis Management Plan; Guidelines for development of methodologies for assessment of risks and hazards and assessment of their implications over the lives, health of the citizens and goods of the country; Guidelines for Preparation of the Unified Risk and Hazard Assessment; historical database for events happened during the past 50 years; Guidelines for Preparation of the Unified Risk and Hazard Assessment; and the Preliminary Risk Profile of the Country.

The Centre for Crisis Management is composed of 30 Regional Centers for crisis management. LSG units have responsibility to participate in training, and other activities related to prevention and management of crisis situation³.

Environment

¹ Directorate for rescue and protection <http://www.dzs.gov.mk/node.aspx?id=1>

² Article 21 of the Law on Crisis Management (Official Gazette of the Republic of Macedonia, no.29/2005 and 36/2011)

³ Article 25 of the Law on Crisis Management (Official Gazette of the Republic of Macedonia, no.29/2005 and 36/2011)

The legislative framework for the environmental policies is set forth in the Law on Environment⁴, and the policy framework is formulated around several strategic documents. The climate lens is at least applied *de jure* in the policy process through utilization of the instrument of Strategic Environmental Assessment. The national government, upon a proposal from MoEPP, specifies the Strategies, Plans and Programs for which it is necessary to undertake environmental impact assessments.

In terms of the specific climate change policy the Law stipulates the obligation for preparation and adoption of a National Plan for mitigation of climate change (hereinafter: National Plan on Climate Change), for a period of six years. The MoEPP is the focal point for preparation of the National Plan, but as climate change is a cross cutting issue, horizontal and vertical coordination is indispensable. Thus in the process of preparation of the National Plan, the MoEPP is required to consult and seek consent from other bodies such as the Ministry of Agriculture, Forestry and Water Economy (MAFWE); Ministry of Economy (MEC); Administration for Hydro-meteorological activities, an entity within MAFWE with legal capacity; Ministry of Transport and Communications (MTC); Ministry of Health (MH).

At the local level, LSG Units are obliged to prepare Local Environmental Action Plans (LEAPs) aligned to the National Environmental Action Plan (NEAP). They must also dedicate budget finances for the environmental protection. LSG units are also obliged to use climate change lenses for specific strategies, plans and programs, through the utilization of the instrument of Strategic Environmental impact Assessment.

Spatial and Urban Planning

In the realm of spatial planning there are two levels of planning: central and local. The national government is responsible for the preparation and implementation of the spatial plan at the central level through the MoEPP and its Agency for Spatial Planning. The spatial plan of RM is elaborated upon by the spatial plan of the region, spatial plan of special interest of the country, spatial plan of the municipality, spatial plan of the city of Skopje, urban planning documentation and architectural urban planning projects. Several types of urban plans are adopted at the local level. These must be aligned to the provisions of the national spatial plan. The Ministry of Transport and Communications (MTC) approves the draft urban plans at the local level that are adopted by the municipal council (vertical coordination). The urban planning process is managed by the municipalities through their sector or department for urban planning. The technical work including basic analyses is performed by the municipal staff in the sector for urban planning in accordance with the law. The urban plans are developed by a licensed company. The content of the urban plans is prescribed by the law on spatial and urban planning and by the rulebook on the content of the urban plans.

Spatial regulation and utilization and the impact on the nature - Spatial regulation is implemented in accordance with urban and spatial planning, and the measures and activities for protection of the nature. The documentation and the procedure of approval of spatial regulation is subject to assessment of the impact on nature and encompasses measures and conditions for nature protection. The documents⁵ which encompass protected areas are approved after obtaining an opinion from the MoEPP. It is now widely acknowledged that spatial and urban planning has an impact on both climate change mitigation and

⁴Law on environment (Official Gazette of the Republic of Macedonia no 53/05; 81/05; 24/07; 159/08 , 83/09; 48/10 ; 124/10; 51/11)

adaptation (planning will influence how resilient a settlement is to the effects of climate change). There is little evidence of integration of these spatial and urban plans with other sectoral plans such as those on water, waste or energy.

Waste management

Legal framework on the waste management sector is based on the Law on waste management.⁶ The general waste management policy in Republic of Macedonia is defined on the basis of the NEAP I and II, which include, among others, the issue of waste management. The National Waste Strategy and the National Waste Management Plan are basic policy documents at national level, and the basic competence for waste management policy implementation rests with the MoEPP (in particular the Environmental administration), individually or in cooperation with other state administrative bodies and LSG units. LSGUs are responsible for preparation and implementation of waste management plans of the municipality, which ought to be approved by the MoEPP, as well as for the creation of an integrated national network of installation for discharge and recycling. Any strategies, plans and programs in this sector must be subjected to environmental impact assessments. Municipalities are also responsible for the management of the communal and non-dangerous waste in their territory. Two or more LSG units can establish a joint program on waste management. Councils can also establish Public Enterprises for collecting and transporting the communal and other type of non-dangerous waste. The Law allows for outsourcing to private sector and inter-municipal cooperation in this area. The government has adopted the approach of establishing regional landfills which involves collaboration of the LSGUs from respective regions. LSGUs are also included in the process for selection of concessioners.

Water Management

The water management sector is crucial to the adaptation efforts in climate change. However, water management also exemplifies the fragmentation of the climate change adaptation efforts which calls for additional efforts for vertical and horizontal coordination. The Legislative framework in this sector is set forth with the Law on Waters (OJ. 87/08 and its amendments). The national government defines the river basin districts, adopts the National Strategy and Water Master Plan, which are therefore becoming normative and binding planning documents. The Government through MoEPP is responsible for granting concessions for economic activities that are performed by using waters from surface and groundwater bodies; adoption of River basin management plans, preparation and adoption of program of measures for each individual river basin management district, and for setting standards on water quality and identification of waters protection zones. The existing institutional capacity of the MoEPP especially with regard to the waters sector is not enough for implementation of all requested activities and obligations. Among other actors, the Ministry of Agriculture, Forestry and Water Economy remains the competent body for functions of irrigation and protection of waters from pollution from agricultural resources (nitrate pollution). The Administration for Hydro-meteorological activities is competent for monitoring water quality, as part of the state monitoring network. MoEPP as the primary competent authority, also performs monitoring of the quality and quantity of waters and protection from pollution and supervises the implementation of the provisions of the Law.

⁶ Law on Waste Management (Official Gazette of the Republic of Macedonia no. 68/2004, 71/2004, 107/2007, 102/2008, 143/2008, 82/2009, 124/2010, 51/2011, 123/2012)

At the local level, LSG units are responsible for protection from, and prevention of, water pollution, drinking water supply, drainage, collection and treatment of wastewater. They carry out activities by the own local infrastructure as well as using infrastructure of the communal (municipal) enterprises, which are practically operating as public enterprises. LSG units are also competent for operation of the local monitoring network for the local water bodies within their respective areas; operation, maintenance, and development of the local monitoring network.

Nature Protection

The legislative framework is set with the Law on Protection of the Nature⁷, and the sector of nature protection operates the basis of the principle of cooperation which underlines that competent bodies in central level, local self-government units and other institutions are obliged to collaborate for the protection of nature. The responsibilities for nature protection rest mainly with the MoEPP (EA) which has full authority to manage and supervise the field of protected area and spaces and the MAFWE, responsible for management and protection of the forests, and regulation in the field of hunting, fishing and plants protection.

LSG units do not have significant competence in the field of nature protection. Their competencies are limited to: Impact assessment on nature of the strategies, plans and programs that can have an impact on nature; and, proposals for declaring a protected area. In addition, LSG units have delegated management rights for lower categories of protected areas: Monuments of Nature and Protected Landscapes. Those LSG units which have National Parks within their territories also participate in the work of the Executive Board of the Public institutions National Park.

For more detailed explanation of vertical and horizontal coordination please refer to the Table on key players in the area of Nature Protection (Annex 3).

Agriculture and Forestry

In the sector of agriculture and forestry, the bulk of the responsibilities rest with the central government institutions and bodies. The Ministry of Agriculture, Forestry and Water Economy (MAFWE) is responsible for formulating and promoting policies and strategies for these areas, as well as for the protection of animals and plants from pests and diseases, water resource management and associated maintenance and improvement of water infrastructure for multiple (rural) uses, well as for establishing a national inventory of forests⁸. MAFWE has an important role in improving rural livelihoods through increasing farm competitiveness and access to markets, as well as reducing barriers for private investment in the sector.

The implementation of the Regulation for the monitoring of Forests (EC/2152/2003) is a competence of the MAFWM, public enterprise "Macedonian forest", Faculty of Forestry, and the Ministry of interior. The Public Enterprise "Macedonian forest" has 30 branch offices and 190 forest management units. .

⁷The Law on protection of nature (Official Gazette of the Republic of Macedonia no.67/2004,14/2006, 84/2007, 35/2010, 47/2011,148/2011, 59/2012

⁸ Article 25, The Law on Forestry (Official Gazette of the Republic of Macedonia, no. 64/2009,24/2011,53/2011)

3. Research methodology

The survey of Flood Risk Management Plan for the Upper Vardar River Basin was conducted from 24.03.2018 until 05.04.2018. For this purpose, a structured questionnaire was developed based on which the households according to previously established methodology. Details of the design of the sample are as follows:

The questionnaire model

The questionnaire used in the survey is a structured questionnaire composed of 48 questions, divided in 5 thematic areas. It is designed to include quantitative and qualitative data that will provide information on demographic and socio-economic position of the respondent, which provides answers and represents his views and perceptions about flood:

The Questionnaire covers questions about floods in relation to the following thematic areas:

1. Demographic data of the respondents

2. Questions regarding their knowledge and information on the floods

3. Questions regarding their property prior to floods

4. Questions regarding their concern about the floods and the level of knowledge/information about the floods

5. Questions regarding how the respondents obtain information and preparing in case of floods.

The key findings from the research in these areas are given below, followed by an overview of general recommendations.

Key Facts: Demographics

1. Demographic information

The total population of Macedonia in 2016 was 2.06 million, with data from the last available country census in 2002 indicating a population breakdown of 64.2% Macedonian, 25.1% Albanian, 3.0% Turk, 2.7% Roma, 1.8% Serb, 0.8% Bosniak, 0.5% Vlach, and 1.0%.

The labour market is characterized by a gender imbalance in favour of males. According to the State Statistical Office, on 2016, the employment rate for women was 39.6%, which is significantly lower than the 60.4% rate for men. While the unemployment rates for women (31%) and men (32%) were quite close, the activity rate for women (46%) is significantly lower than for men (64%). This is particularly the case in rural areas, and probably indicates a much greater reliance by women on the informal economy where risks are higher and wages and benefits are lower.

In upper Vardar river basin which covers total of 1574 km² has 138 Settlements and total population of 294.935, with density of 187 inhabitants in 1 km² which is one of the most density populated area of Macedonia. Also another interesting fact is that the population is relatively young, 66% of the population is between age of 15 -65.

4. Survey results and key findings

Survey is carried out in the research sites/localities where flooding have occurred in the past and in localities that are in particular risk according to the relevant stakeholders identified in the upper section of the report. A total number of 410 respondents participated in the Survey. Prior to the survey, the draft questionnaire was tested in a pilot study. Ten questionnaires were distributed among socially and demographically different test persons, mostly from the research locations, in order to check the comprehensibility and effectiveness of the questionnaire and its logic. Consequently, several questions needed to be revised.

The geographical structure of the entire questionnaire sample is relatively balanced. 52% men and 48% women took part in the survey. 8 mainly older households (2%) filled in the questionnaire together which mirrors the high subjective relevance of the topics for the respondents. The Survey was conducted in 9 municipalities in the Polog Region and the % of the respondents by municipality and the sample is reflection of the population in the municipalities. Highest percentage of the respondents are from municipality of Tetovo 27% and Gostivar 20% and lowest percentage from Saraj 3% and Jeguovce 5%. It is important to highlight that every village and settlement in the each municipality was covered in the survey according to the survey ample

In terms of residence, 71% of the respondents had a residence in Tetovo region, 26% in Gostivar region and 3% in Skopje region.

The gender structure of the entire questionnaire sample is relatively balanced. 52 % of the respondents in the survey are female respondents and 48% of the respondents are male. It is interesting that predominantly female respondents felt addressed by the survey. We assume traditional household structures and a respective internal division of labour where women are responsible for the households and are unemployed and due to the fact that the survey was carried out through the method of visits in the households is the main reason for prevalence of women as respondents.

The multi-ethnic component of the region makes indispensable to be reflected in the Survey as well. According to the ethnic structure, 79% of the respondents are Albanian, 15% are Macedonian, 3% are Turkish and 3% of the respondents belong to Roma community.

The age structure of the respondents is heterogeneous as well. According to age structure highest percentage of the respondents are 50+ (29,3%), followed by age span 42-49 (23,7%), and the lowest percentage belonging to the age span 18-25 (7,1%)

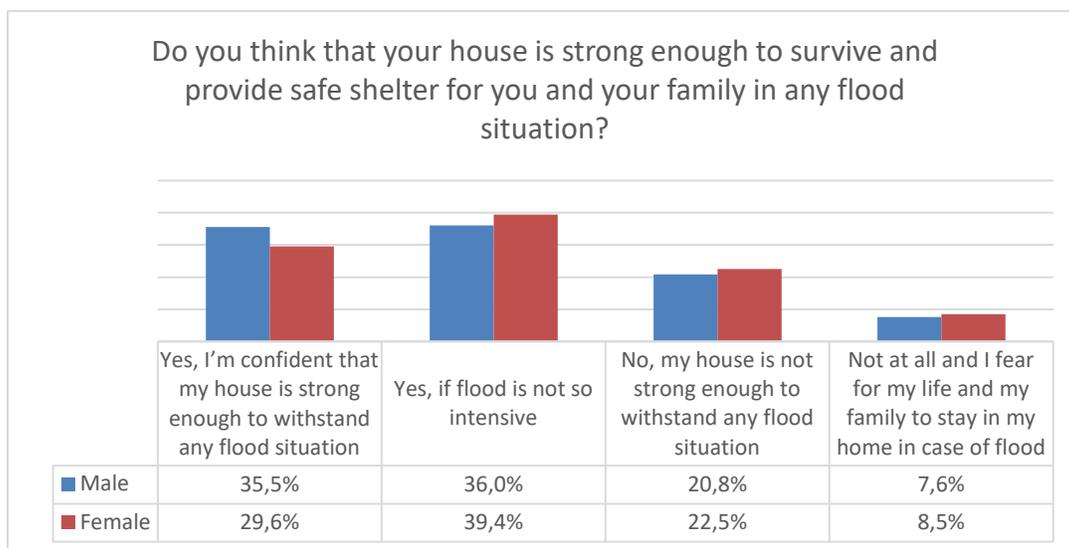
Employment status is important variable relevant to take into account in terms of the social vulnerability. Accordingly: 12,2 % of respondents are Unemployed, 7,1% are Pupil/ Student, 7,3% Retired, 30,2% Housewife, 8,5% Farmer, 21% Employed in the private sector and 13,2 % Employed in the public sector

Education is variable related with quality of life. Higher education attainments increase quality of life, and lower education level are in correlation with social vulnerability. Highest percentage of the respondents, 29,8%, have completed secondary education, 23,2% have completed primary education, 22,4% have completed higher education, 19,8% haven't completed primary education and only 5% have graduated in MA, PhD studies.

Household structure. When thinking of a sudden case of emergency then one might assume that for the ability of a household to react in an appropriate way, its structure is crucial. Especially households with dependent persons—understood as either children under 18 years and/or disabled and permanently ill persons, respectively—are presumably more vulnerable than households in which every person can rely on her-/himself. 7,1% of respondents have up to 2 members, 34,6% have from 3-4 members, 38,3% have 5-6 members and 19,8% have more than 6 members (Table 6 Number of family members). The findings shows that overwhelming majority (93 %) of the respondents live in family households with dependent persons and thus are socially more vulnerable.

Respondents were asked if their house is strong enough to survive and provide a shelter for them and their family. 37,8 % said yes if the flood is not intensive, 32,4% said yes that the house is strong to withstand any flood situation, 21,7% said that their house not strong enough to withstand any flood situation. In terms of responses according to gender women are less confident than man that their house is strong enough to withstand floods (29,6% vs. 35,5%)

Figure 1 Is the house strong enough to survive any flood situation



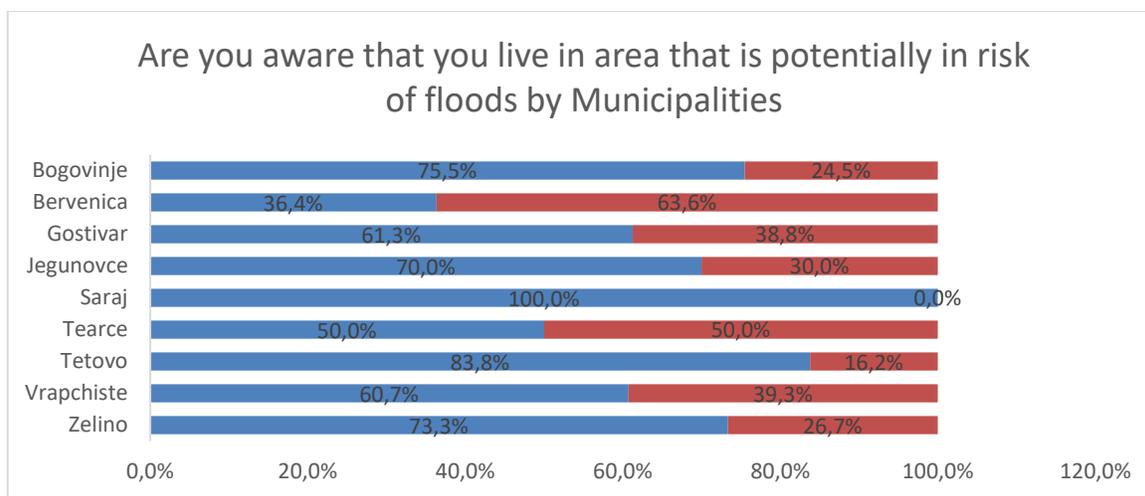
(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

It is interesting to highlight that 31% of the respondents are not aware that they are living in area that is potential risk of floods. Majority of those who are aware about the risk of floods have witnessed themselves floods or they have been informed by the elderly, and only non-significant percentage (10%) have been informed by the government or media. This shows the need for more proactive approach of the government for increasing and informing the local community about the flooding and consequences of the flooding.

If the issue of awareness is analyzed in specific municipality, it can be noted that the respondents from municipality of Saraj are most aware about the risks of the floods (100%) followed by the municipality of Tetovo (83,8%), Bogovinje

(75,5%) and the least aware are respondents from the municipality of Brvenica (36,4%). Further research is needed to determine if there is a correlation between occurrence of floods and awareness of potential risks.

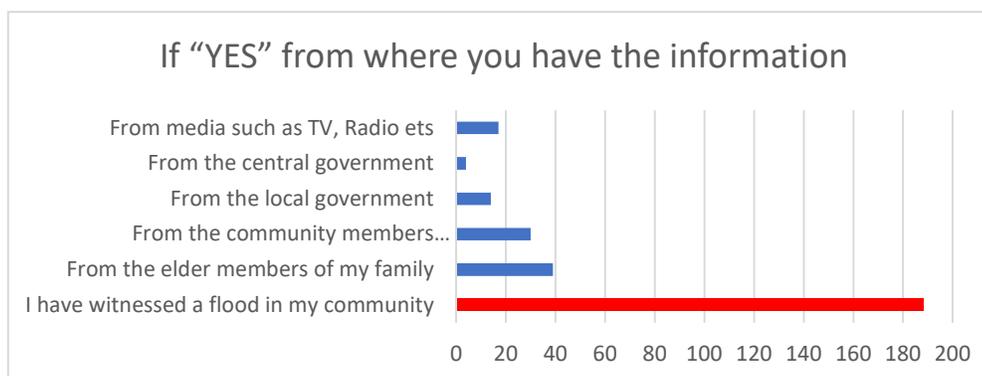
Figure 2 Awareness divided by Municipalities



Respondents who responded with Yes to the previous question we asked how they obtained information regarding the flood risk. Accordingly, 45.9 % of the respondents have witnessed flood in their community, 9,5% are informed from elder members of their family, 7,3% from neighbors, 4,1% from TV and Radio and 3,4% from the local government (Figure 3).

Figure 3 How citizens information flood risk

the obtain on



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

33,4% of the respondents said that their community was flooded in the last 2 years, 23,4 % that it was flooded in the last year, 22 % of the respondents have not witnessed any floods in their community, 6,3 % in the last 50 years and 7% 50 years ago.

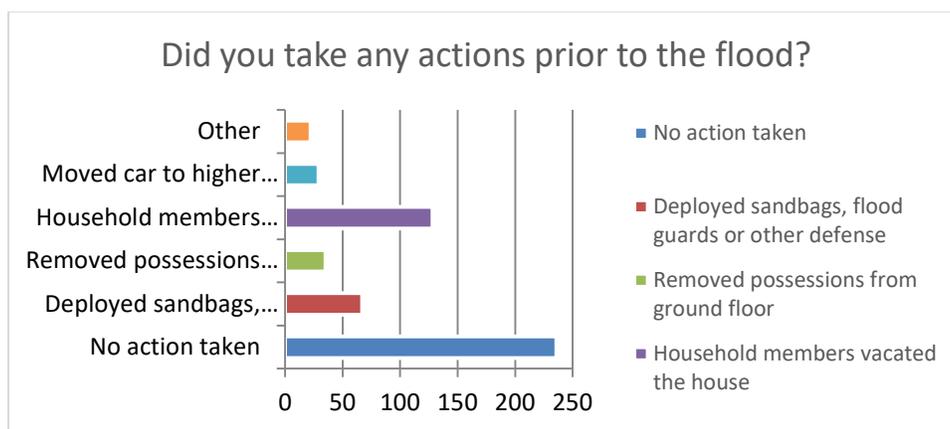
31 % of the respondents who witnessed floods said that their homes were flooded during the floods. It is interesting that 69% of respondents said that their house was not flooded during the floods.

One of the questions in the questionnaire was the depth of the flood water. 54 % responded that the depth of the water was 5-50 cm, 38% more than 50 cm and 8% less than 5 cm. 89% respondents have had mud, silt or sediment deposits, 9% of

the respondents said that they did not have this type of deposits and 2% didn't know if they have had any type of deposits. 77% of the respondents said that they had sewage deposits.

Respondents were asked if they have taken any actions prior to the flood. 46% of the respondents responded that they have not taken any action prior to flood. 13% of the respondents deployed sandbags, flood guards or other defence, 7% of respondents have removed possessions from the ground floor and 25% have vacated their family members from the house (Figure 12). The findings exemplify that around 50% of the respondents have not taken any action, and it is highly relevant to assess what are the reasoning for such an approach.

Figure 4 Action taken prior to the flood

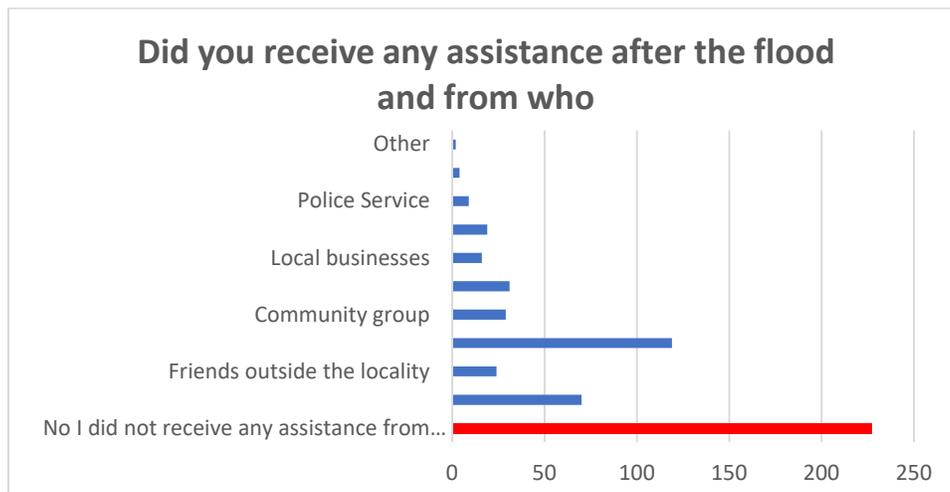


(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

Respondents were asked if they have received assistance after the floods. 41,3% % did not received any assistance, 21,6% received assistance from family outside their household 12,7% from friends from their locality, 5,3% received assistance from their community, 5,6% from church/mosque, 3,5% neighborhood units 0,7% from the fire department and 1,7% from police. It is evident that respondents more rely to family and community network and less then governmental institutions for the assistance (See Figure 15). In addition it is noteworthy for decision makers that overwhelming majority haven't received any assistance.

In line with this was also the opinion of the focus group they stated that they hand no ore little assistance from the municipality and one of the participants responded by saying that the financial aid he had received barely covered 20% of the damages caused by the floods. Another participant claims that the only aid he has personally gotten is drinking water, despite what he had been previously promised by the authorities.

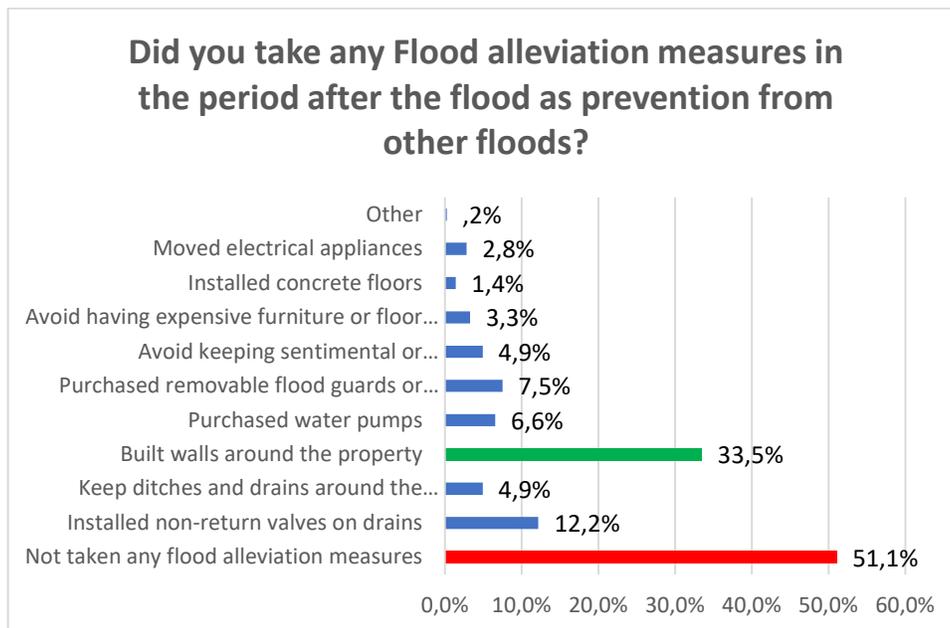
Figure 5 Receive assistance after the flood



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

More than half of the respondents 51,1% have not taken any flood alleviation measures, 33,5% have build walls around the property, 12,2% installed non-return valves on drains, 7,5% purchased removable flood guard, 6,6% purchased water pumps (Figure 16). Again it worrying that every second respondent has not taken any measure for protection and prevention.

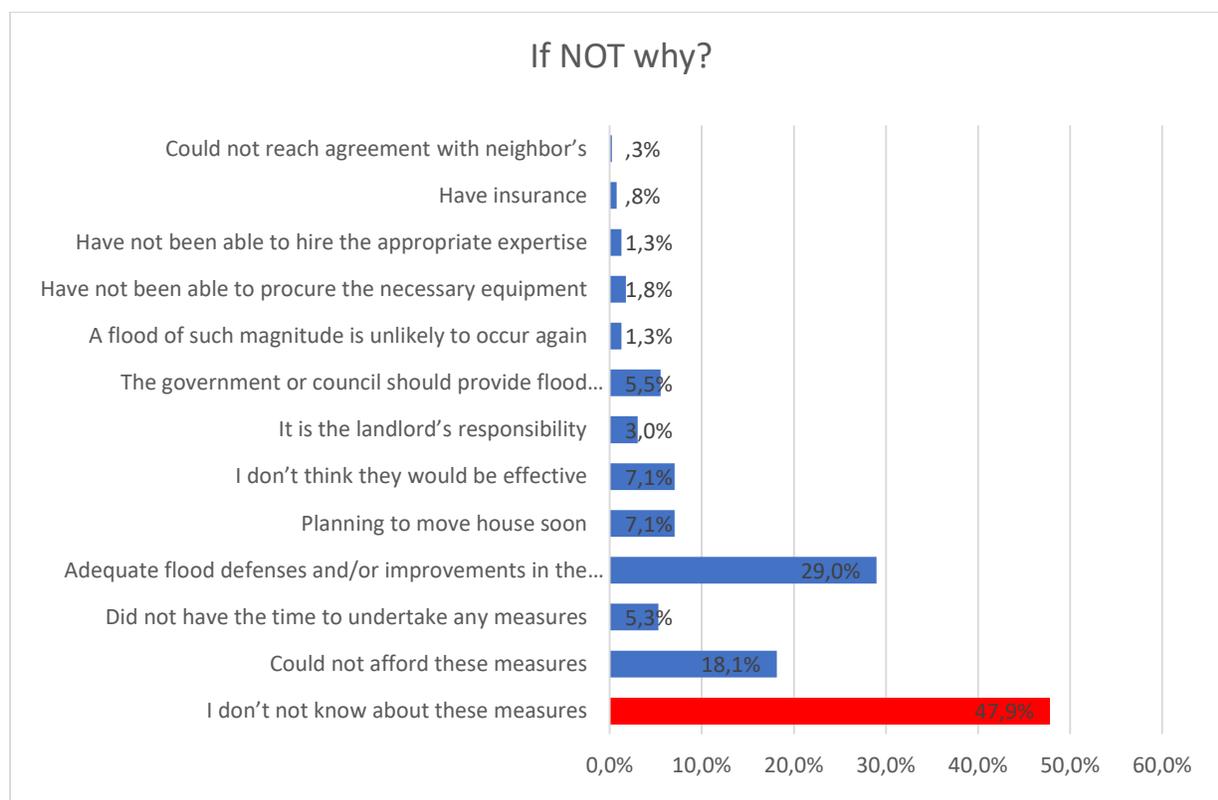
Figure 6 Flood alleviation measures in the period after the flood as prevention from other floods



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

50 % of the respondents who did not take any measure were asked the reason why they have not take any flood alleviation measures. Again 50% they have no idea about these measures, implying that there is a need for information and awareness raising regarding the importance of these measures. 29 % of the respondents did not take any measures due to existence of adequate flood defenses and local drains in their community, 18% can not afford that type of measures, 7,1% believe that such measure will not be effective, 5,1% don't have time to take such measures. This exemplifies the need for increasing awareness and knowledge about types of measures that inhabitants can undertake for prevention and protection in their individual household.

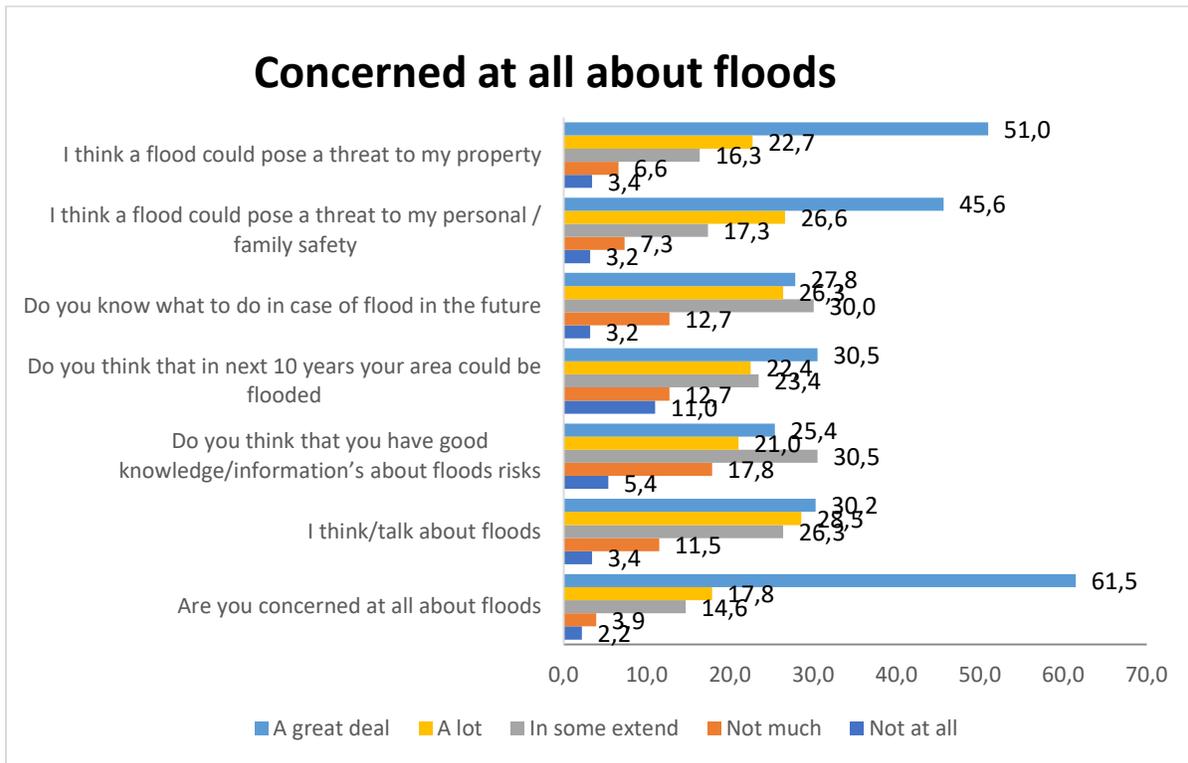
Figure 7 If not taken alleviation measures in the period after the flood as prevention from other floods why



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

The respondents were asked if they are concerned with floods. 61% have a great deal of concern about the floods, 18 % are concerned a lot, 15% in some extent and 2% are not at all concerned with floods. Only 3,2 % are in opinion that the floods are not posing a threat to them and their family, overwhelming majority see some type of a threat from the floods. Nearly half of the respondents have in some extent or not at all understanding what to do when they face a flood. This again reiterates the need for building the community awareness and capacity for flood protection. Again majority (83%) of the respondents are in opinion that their settlement will be flooded in the next 10 years. More then half of the respondents, have to some extent, not much or not at all, knowledge, information about the risks of the floods. Overwhelming majority of the respondents 89% are a great deal or lot concerned about the impact of the floods in their settlement (Figure 8).

Figure 8 Concern about flood

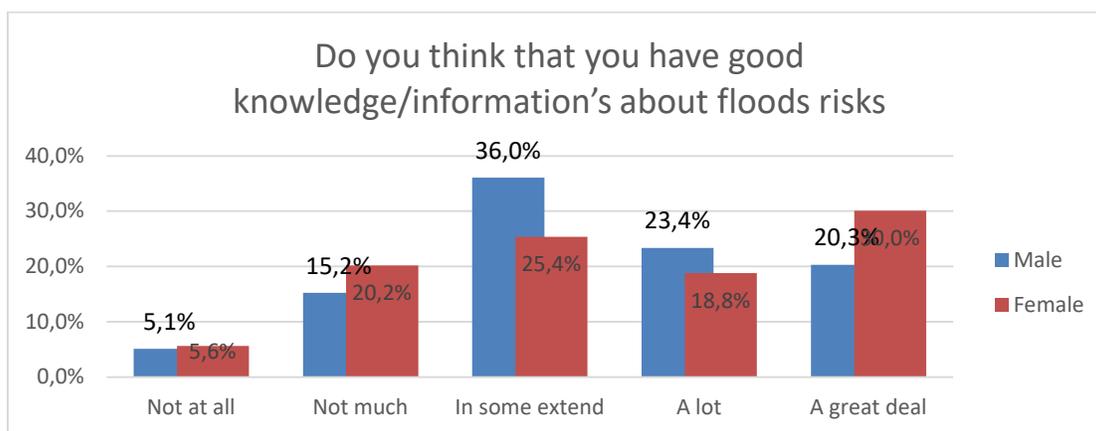


(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

In terms of gender, percentage of female respondents who have a great deal of knowledge compare with male is higher (30% vs 20,3%) and it is also interesting that respondents who have not at all knowledge if they are analyzed by gender, there is no significant difference in terms of gender (0,5%).

Contrary to the opinion of the respondents of the survey , the participants in focus group stated that they have very little knowledge on how to deal with the floods, they have never been trained or told how to deal with the situation in case of a flood and one of the participants stated that the residents know very little in dealing with the floods and they tend to panic, speaking from his personal experience where his son barely managed to save his children.

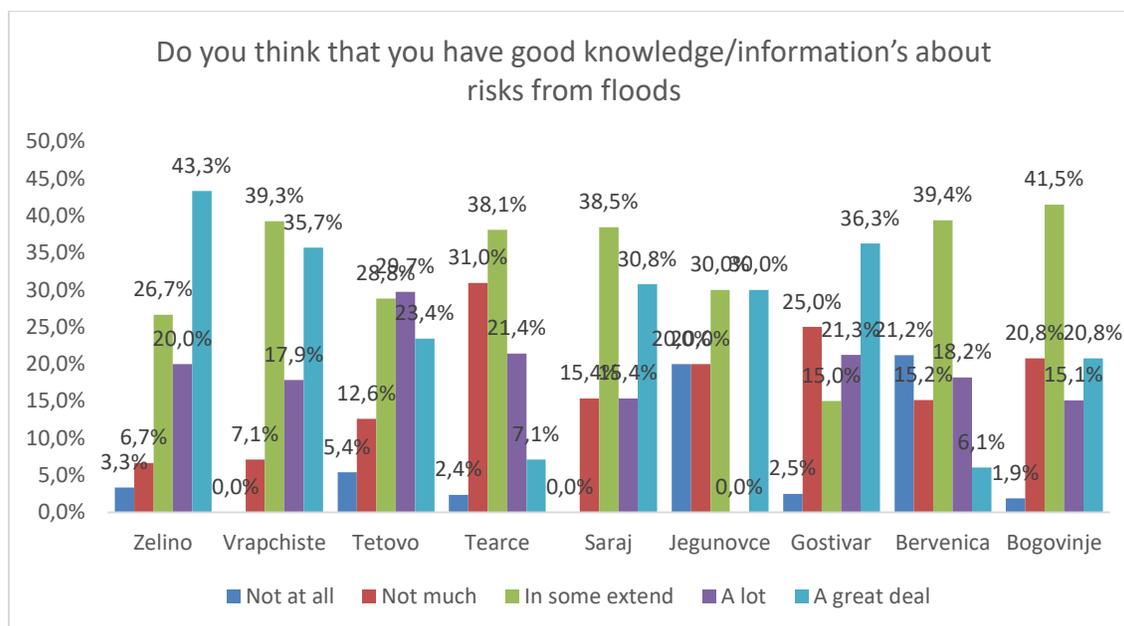
Figure 9 Do you think that you have good knowledge/information's about floods risks



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

In terms of geographical position, nearly have of the inhabitation of municipality of Zelino are in opinion that they have information and knowledge regarding risks from flooding, followed by municipality of Gostivar 36, % Vrapciste with 35,7 %, every fourth respondent in the municipality of Tetovo also does have knowledge and information on risks from flooding. 15% of the respondents from the municipality of Brvenica have no information and knowledge about risks from flooding (Figure 10).

Figure 10 Do you think that you have good knowledge/information's about floods risks with municipality



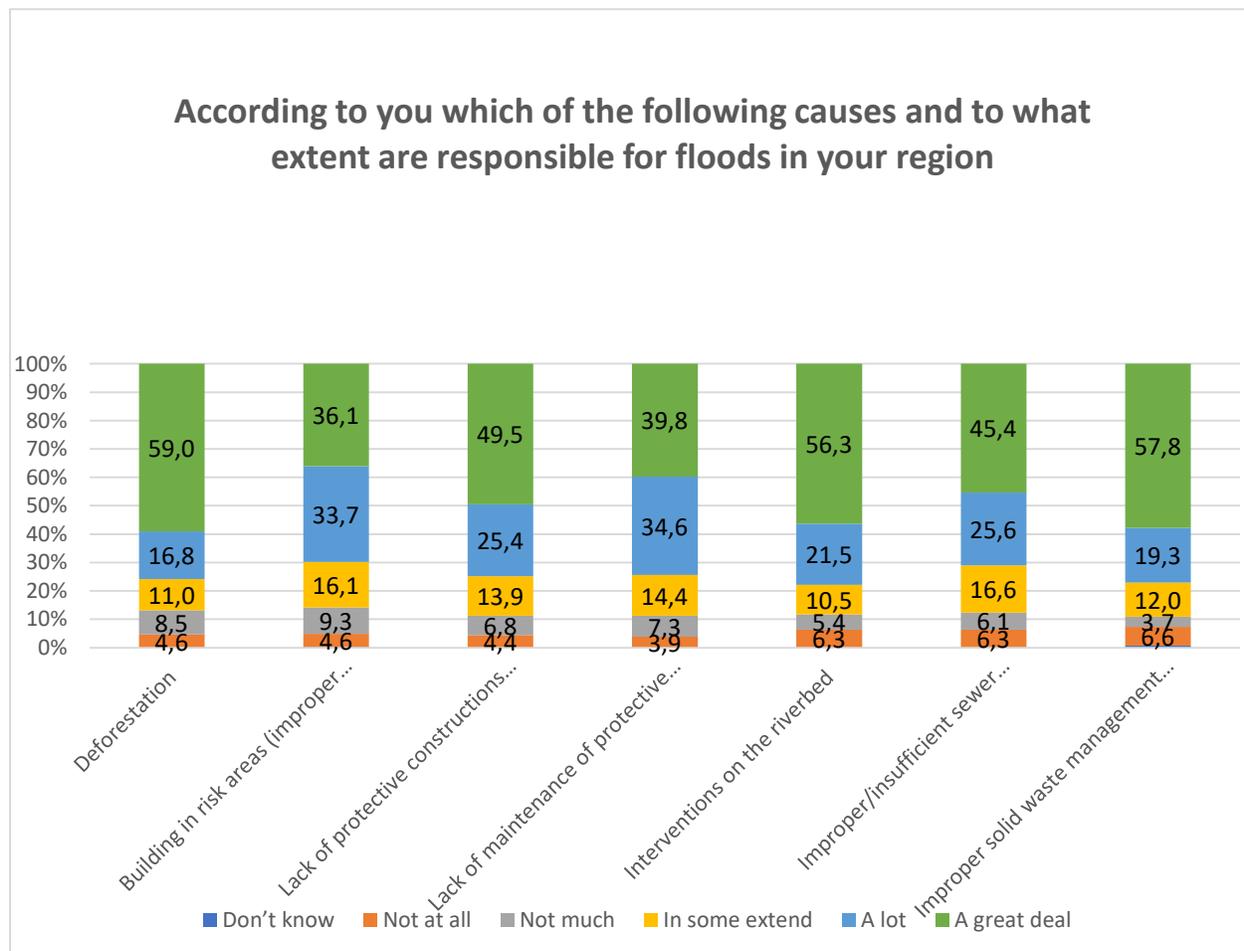
(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

The respondents were asked if building in risk areas may be a reason for flooding, 59% of the respondents believe that deforestation is the main reason for flooding in their region, and only 4,6 % don't believe that the deforestation is the

reason for flooding. Overwhelming majority of the respondents believe that building in risk areas a great deal, a lot or in some extent can be cause of flooding. Around 74 % believe that lack of maintenance of the protective infrastructure against flooding can be cause for flooding. 57 % are in opinion that in proper waste management to great deal leads to flooding in the region. Similar responses are noted with the lack of intervention in the riverbed, improper sewer network. Closer look to the responses, puts into the light that the respondents believe that floods are caused by conjunction of above-mentioned causes in the previous questions (Figure II).

In the same light participants in the focus group highlighted that the main causes for flooding's were the uncontrolled deforestation and solid waste. One of the residents mentioned that the alarming illegal deforestation is supported by the institutions that are there to prevent it, The residents had been continuously complaining both formal and informally to the respected institutions about the alarming deforestation, they had protested before in front of the mayor's office by blocking the main road, however they had not been taken seriously even tho they reported the individuals responsible for the illegal deforestation.

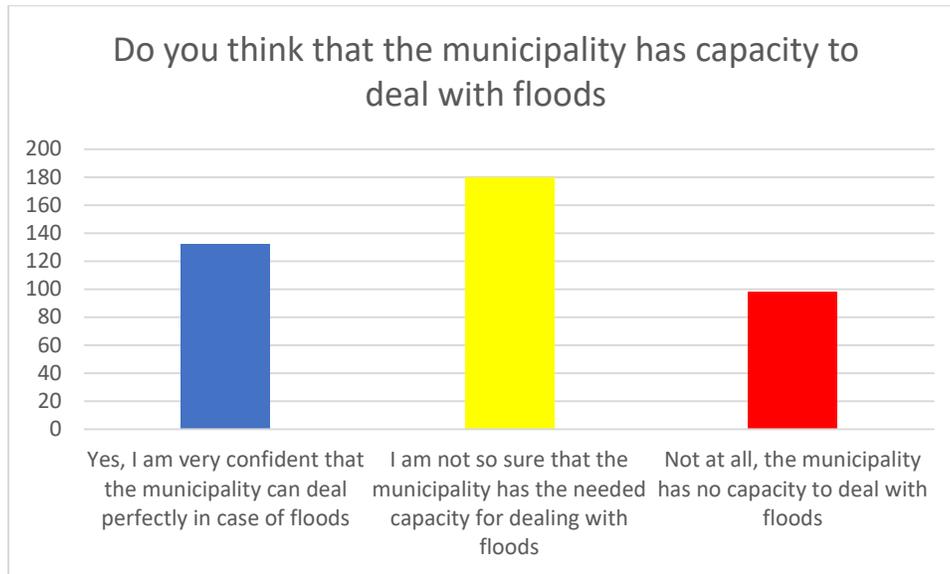
Figure II What are the main courses for floods in the region



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

According to the Survey, 43,9% of the respondents are not sure that their municipality has the capacity to deal with floods, 24 % are sure that the municipality does not have capacity to deal with floods and every 5 respondent believe that the municipality can deal with the floods (Figure 12).

Figure 12 Municipality does it has the capacity to deal with floods

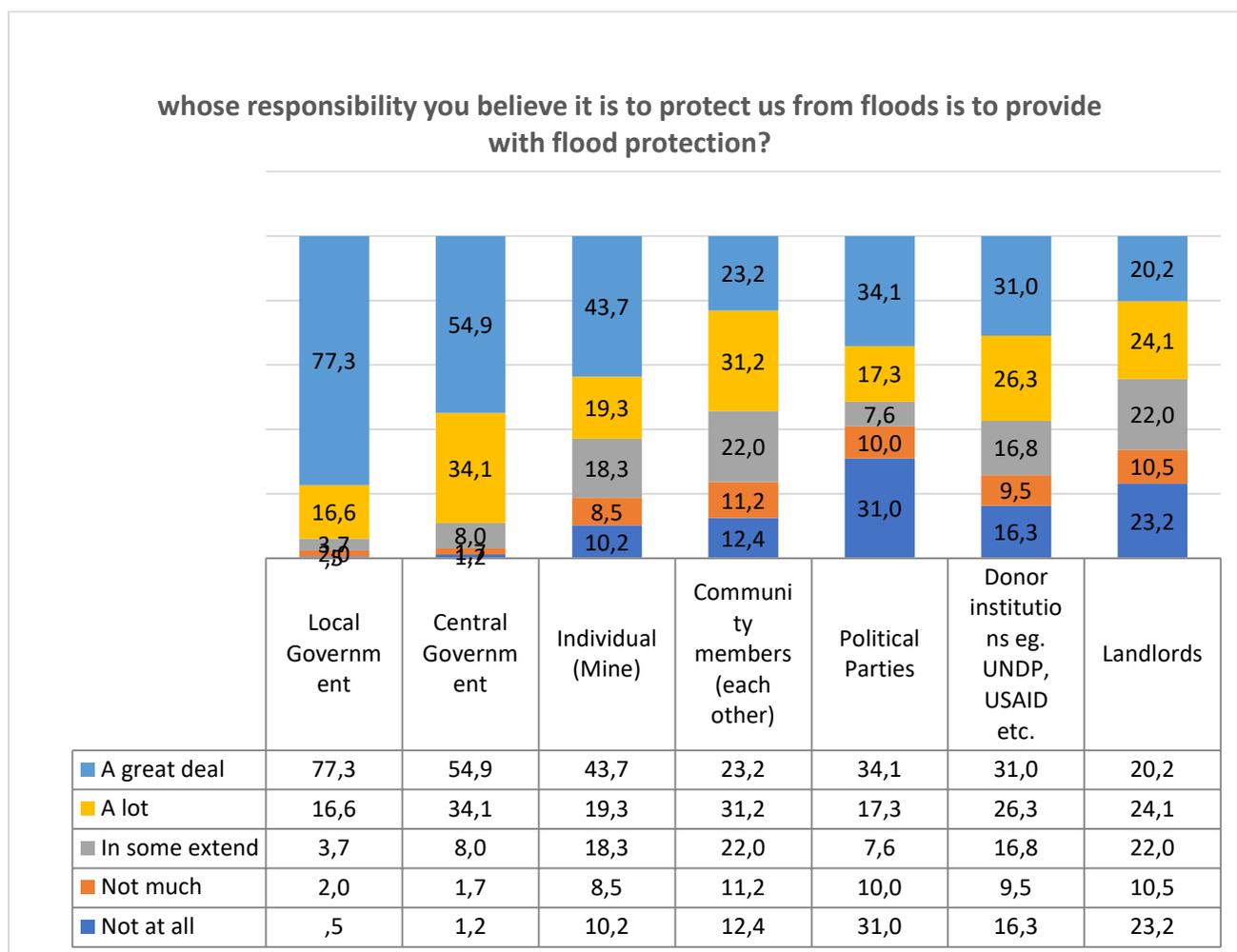


(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

Respondents were asked to assess whose responsibility is to protect them from floods. 94% of the respondents believe that this is the responsibility of the local government institutions, Around 89% are in a opinion that this a responsibility of the central government, interestingly 1,2% of the respondents believe that this is not a responsibility of the central government. Around half of the respondents believe that it is a great deal their responsibility and 10 % believe that is not their responsibility at all. Every 5th respondent believes that a great deal it is the responsibility of the community, around 53% believe that it is a great deal or a lot responsibility of the political parties, similar percentage are in opinion that is responsibility of the donor organizations and around 43% believe that it is the responsibility of the landlords (Figure 13).

Participants in the focus group are in opinion that the local government should be responsible for handling and maintaining the situation and that this was the way it was handled during the Yugoslav time. According to the locals the local government should invest in projects about this matter financed by the central government. They also claim that the residents are also responsible since there are illegal building constructions around the riverbank that cause its narrowing. Many promises were given by the actual prime minister before and after the elections, but they were not fulfilled.

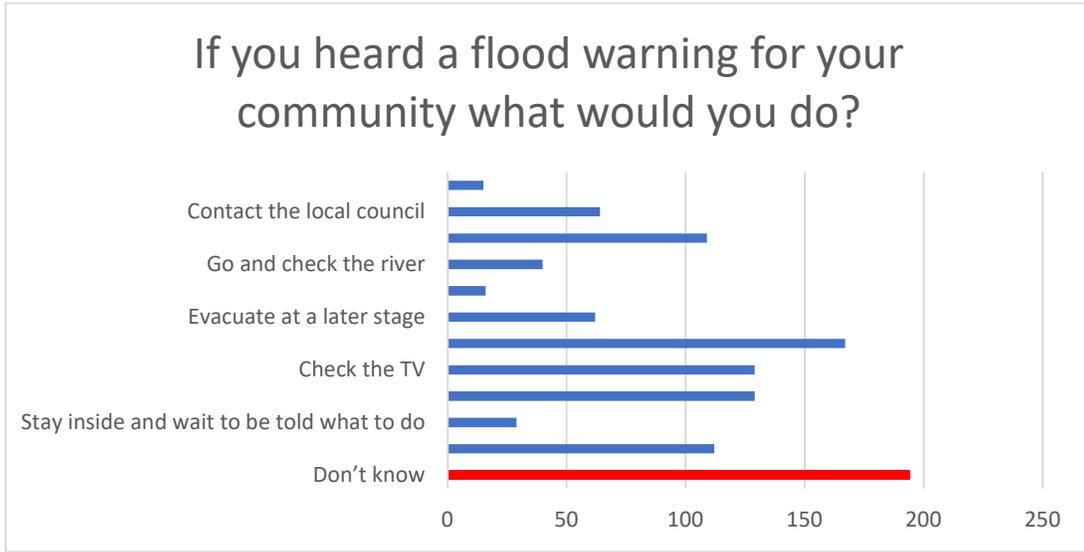
Figure 13 Whose responsibility you believe it is to protect us from floods is to provide with flood protection



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

The respondents were asked if they have heard flood warning in their community what would you do. 18,2 % don know, 6 % would contact local council, 3,8% check the river, 12,1 % check the TV, 5,8% evacuate at a later stage 2,7% stay inside and wait to be told what to do (Figure 14).

Figure 14 In case of flood warning what would you do



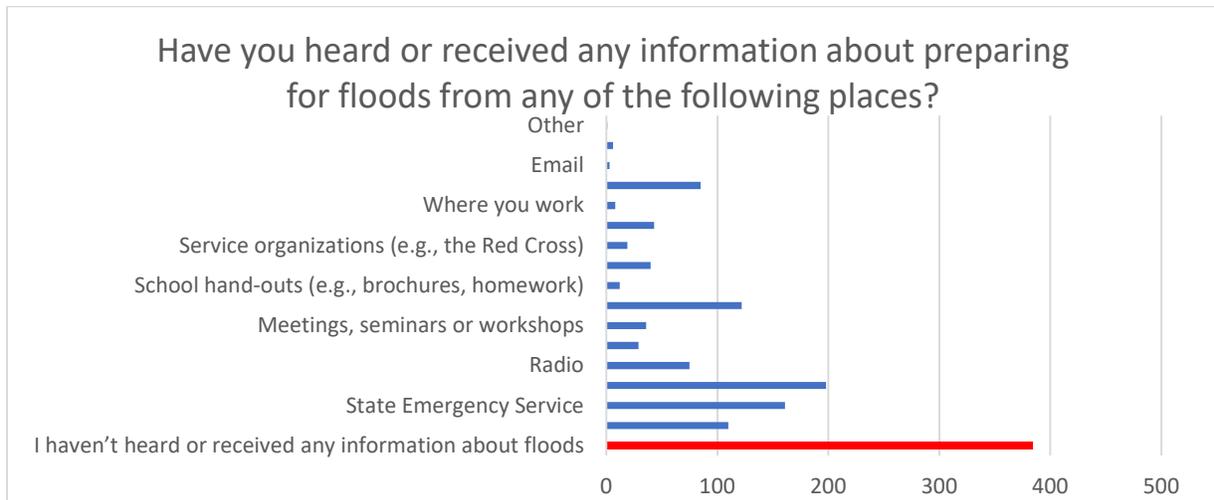
(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

Respondents were asked about their approach in term of obtaining road information about the flood. 27,8 would contact local municipality, 14,4% would contact road and traffic authority, 15,2 % contact neighbors, 9,8% state emergency service, 3,6% check the internet. And 17,1% don't know who to contact for road information in a flood.

76% of the respondents would evacuate immediately when they are told, 9% would wait until the water reaches their house and then decide, 3% would wait for emergency services, 6% use phone to call for help and 3 % don't have an idea

According to the Survey, 28% have not heard any information about the floods, 12,1 % received information from State Emergency Service, 9%; School hand-outs (e.g., brochures, homework); 6 % for the work place, 5,6% from Radio, 2,7%; from meetings, seminars or workshops and 2 %, from Emails (Figure 15).

Figure 15 Have you heard information about preparing for floods



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

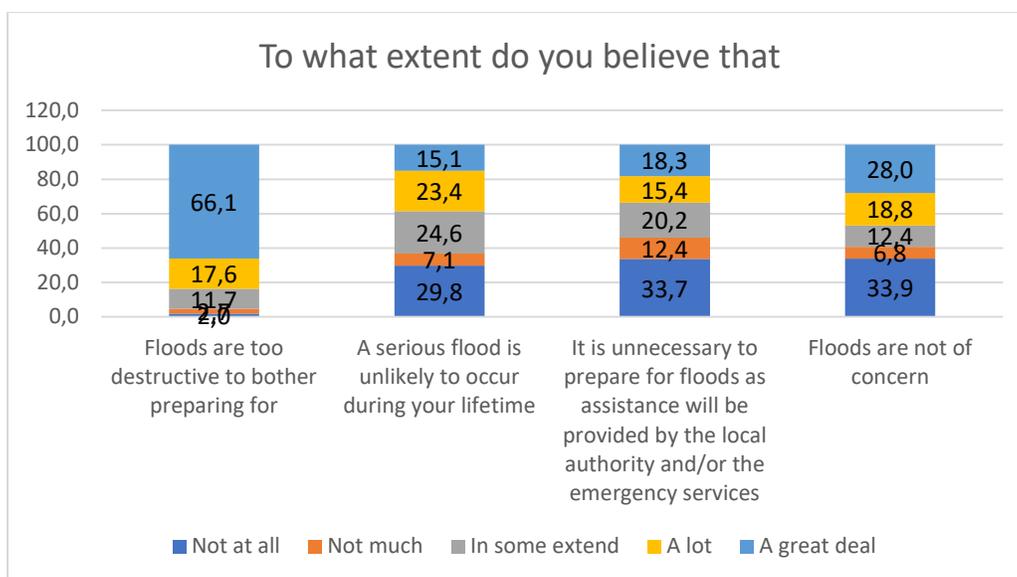
Respondents were asked to specify the means/channels of information for flood preparation. Majority of the respondents would prefer TV (24,3%), followed by internet 15,5% %, radio 14,6 %, brochure via email 6,8% and the least preferred mean/channel of information is newspaper or magazine advertisement.

In case of floods, preferred means of communication for the community are TV (30%), Internet(24%) and telephone (17%). It is interesting that new approaches of e-service such as apps are not recognized by the community as feasible tools for information of the community.

The respondents were given certain statements about floods and flooding in order to derive their perception about, need for prevention/preparation, their expectation that flooding will happen in their life time, the role of authorities. 87% of the respondents are in a opinion that floods are too destructive to bother preparing for, 30 % of the respondents believe that serious agree with the statement that a serious flood is unlikely to occur during their life time and 39% believe that there is a lot of chance and great deal to happen in their life time. 34% of the respondents do not agree with statement that it is unnecessary to prepare for floods as assistance will be provided by the authorities (Figure 16).

In line with this, the participants were asked whether they had any psychological support by professionals. They stated that they had no such support either that they are thinking that it is very important for them to have psychological support since they are in constant fear and anxiety every time the weather changes.

Figure 16 Opinion about floods



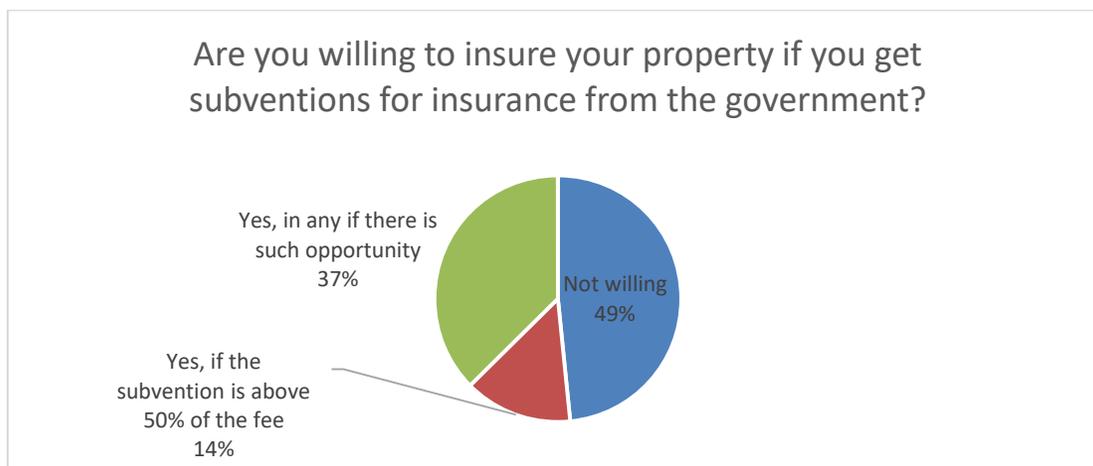
(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

2/3 of the respondents are not willing to pay any extra taxes for flood protection. This may be the case having in mind that respondent either do not believe that authorities are doing enough or due to the fact that majority of the respondents are coming from poorer strata of the society. It is interesting to further analyze why is this the case is it as a consequence of

the believe that this is a responsibility of authorities, or believe that additional taxes will not bring better services in the area of flood protection.

Citizen were asked if they are willing to insure their property if they would get subventions for insurance from the government. Nearly half of the citizens are not willing to insure their property even if they get subvention from the government. 14% are willing to pay if the subvention is higher then 50% of the fee and 37% are willing to insure their property if there are subsidy policy by the government (Figure 17).

Figure 17 Insuring property against disasters



(Source: survey "Flood Risk Management Plan for the Upper Vardar River Basin", 2018)

5. Conclusions and Recommendations

Designing a proper management strategy to tackle flooding in urban and rural areas requires integrated approaches which take into account a broader set of local indicators that consider the social, physical and ecological dimension of vulnerability. Vulnerability is therefore not a matter of only exposure, but rather a combination of exposure with local socio-economic factors.

Findings from the analysis bring into the light the following conclusions:

Institutions within the Upper Vardar Basin region lack available tools and mechanisms for collaborative approaches to floodplain management. Citizens argue that there is a lack of intergovernmental and inter-institutional cooperation in times of flooding which increases vulnerability to flood.

Respondents in the study had no awareness of mitigation options for their settlements, and the details related to, for example, emergency response plans. This is a result either of poor participatory process for flood management decision making or that this type of planning for Upper Vardar Basin region **is non existent**. Accordingly, there has been no evidence of a multiple hazards planning approach to planning in the Upper Vardar Basin region.

Findings put into the light the access to economic resources (low income) of the residents of the Upper Vardar Basin region which has negative impact on resilience to any hazard as result of the lack access to economic and social resources. 2/3 of the respondents have monthly income less the 350 Euro (Figure 4 Economic status). Put it differently more 66% of the respondents (households) earn less then medium salary in the Republic of Macedonia.

For the residents of Upper Vardar Basin, informal social networks are the most important source of support during the flood which, in the perception of the people affected, they provide material, physical and mental support which often preceded the material compensations provided by public authorities.

Formal institutions (local authorities, central government, fire brigades) are not seen as a trustworthy partner for support in the immediate hazardous situation.

A rural/urban divide within trust on the capacity of formal networks was obvious in the findings. It is interestingly to note that the trust in the formal institutions in rural municipalities is higher than in the urban municipalities.

Flood awareness and knowledge served as the focus of investigation, due to the fact that awareness is a necessary precursor to preparedness, the lower one's 'awareness' about some kind of danger, the more one is vulnerable to it. The findings show that there is low awareness regarding flooding and flooding preparation. Related, the residents of the Upper Vardar Basin region not only are not aware of flood history and hazard context, but also lack understanding on what is their role what are the role of the institutions and avenues and approaches for prevention and protection in case of hazard by floods.

Structural measures -Citizens are in opinions that not much has been done in structural measures such as dams, levees, and floodwalls in order to reduce the probability of flooding in the location of interest.

Property insurance- Is seen as a luxury that the majority of respondents can not afford. Moreover, there is a believe that the government is solely responsible for people's security and most essential needs, allowing them to abdicate individual responsibility.

Recommendations

The diverse causes and factors influencing vulnerability suggest that the problem of vulnerability must be addressed at multiple levels and involve many stakeholders. Vulnerability reduction requires multi-sectoral approach in terms of decision making and in terms changing values and beliefs about hazard and how to deal with hazardous situation. Most important, vulnerability reduction efforts in the Upper Vardar Basin require the ability to integrate understandings that social, economic, political, variables as well as the biophysical aspects ought to be taken into an account in creating safer communities.

Mapping of social vulnerability in the Upper Vardar Basin- Policy makers should develop map of social vulnerability in the region as *condicio sine qua non* for any intervention. The map of social vulnerability should be focused in two dimensions: Identification of 'at risk' areas in the Upper Vardar Basin Identification of 'at risk' population in the region (elderly, children, women, unemployed, owner/or not, owners of vehicle). This approach would provide avenues for tailor made interventions at the risk area and for the risk population to enhance their capacity to deal with floods.

Change of public perception of flood risk and the role of stakeholders- Formal institutional actors (municipalities, planning regions Center for Crisis Management, Directorate for Rescue and Protection) should initiate platform for information and education as first step to perception change. Special focus ought to be given to the youth from the risk areas with information pamphlets and public meetings where a witness of the flood would pass the information about the ramifications and consequences of such an hazard in order to attach this in the collective memory of the community, hence if flood risk is part of collective conscience then change of perception and behavior will happen.

Flood management decision making- The region has to have flood management plan created by involving the community. In the process of flood management decision making (ex. emergency plans, volunteer fire brigade, approaches to reconstruction efforts after flooding) authorities have to find avenues to involve representatives of the community from the risk areas and from the risk population, in order to increase awareness of the population and at the same time build the capacity of the community for protection and prevention. In addition, decision makers (Central Government Mayors with LEAP) should introduce inclusive consultation process in discussion related to the mitigation approaches and introduce

mechanisms for active involvement of the community in prevention efforts.. Approaches such as hazard forecasting, early warning systems, and emergency plans can reduce or eliminate casualties and property losses.

Build up and utilize the expertise from the grassroots organizations (NGO) for mitigation alternatives -

Existence of the NGO that are working in the area of environment and mitigation would facilitate participation of community residents in addressing flood risk. In this manner, support for this type of NGO in order to achieve sustainability would have benefit in long time and they will serve as proactive promoters of mitigation and watch-dog instruments to monitor policies of decision makers in the area of flood management. One clear and current example is the ecological NGO which conducted the survey who has experience on environmental issues and mitigation.

Structural measures –Invest time and resources in structural measures as one of the main pillars of reducing probability of flooding in Upper Vardar Basin region.

Property flood insurance- Damages from the flooding have economic tool for individuals and the local and central budget. Thus, it is indispensable to introduce economic support for the most vulnerable population in the risk areas to insure their property against natural disasters (floods). Introduce tax incentives (central and local government taxes) for the house holds that have insured their properties and that are situated in risk areas.

Transparent communication with the community- Perceptions can only be altered when information about risk creation is able to be interpreted, discussed, and debated with all stakeholders. This research suggests that there ought to be mechanisms within the Upper Vardar Basin that ensure that shared misconceptions about vulnerability to be identified and addressed.

Land-Use Planning and Zoning-Wise land use is at the center of nonstructural flood mitigation activity and is an effective tool for reducing risk at the community level. It is evident that in the Upper Vardar Basin there is construction in areas that may be subject to flooding. Spatial planning polices have to take into account the impact on the environment, and the monitoring and prevention of iligel construction is foundation for flood prevention.

Introduction of courses related to hazards (floods) in primary, secondary and tertiary education institution, in order to build awareness and the capacity of the local community to be actively in prevention and protection in situation of floods. In parallel, similar endeavors can be organized with adults from socially vulnerable community through methods of non-formal education.

Specific approaches of increasing awareness related to the adaptation and mitigation in the Upper Vardar Region with an aim to build the sensitiveness toward protection of nature, waste management and protection of waters.

Psychological support-More focus on psychological support of the residents who faced floods. Majority of the respondents emphasized the need for psychological support which is lacking in this type of stressful situation.

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