



Food and Agriculture
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Comprehensive analysis of the disaster risk reduction and management system for the agriculture sector

The Former Yugoslav Republic of Macedonia

Enhancement of Disaster Risk Reduction and Management (DRRM) capacities and mainstreaming Climate Change Adaptation (CCA) practices into the Agricultural Sector in the Western Balkans” (TCP/RER/3504)



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Acronyms

AWS	Automatic Weather Station
AYII	Area Yield Index Insurance
CMC	Crisis Management Centre
CMS	Crisis Management System
DRR	Disaster Risk Reduction
DRR/M	Disaster Risk Reduction and Management
EC	European Commission
GOS	Global Observation System
FYR	Former Yugoslav Republic of Macedonia
HFA	Hyogo Framework for Action
HMS	Hydro-meteorological Service
JRC	Joint Research Centre
NARDS	National Strategy for Agriculture and Rural Development 2014-2020
PDNA	Post-Disaster Needs Assessment
PRD	Protection and Rescue Directorate
RNA	Rapid Needs Assessment
RCMC	Regional Crisis Management Center
SEEC CRIF	South East Europe and Caucasus Catastrophe Risk Insurance Facility
SFDRR	Sendai Framework for Disaster Risk Reduction
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WMO	Global Observation System

Introduction

The Former Yugoslav Republic (FYR) of Macedonia is prone to various types of natural hazards, including earthquakes, floods, droughts, wild fires and landslides. Floods, in particular flash floods, in combination with land and mudslides are the most regularly occurring hazards. Agriculture, which extends mostly along rivers, is among the sectors that is most affected by these hazards. In addition, it is also impacted by drought due to reduced summer moisture availability. It is expected that with climate change, these extreme weather events will increase in frequency and severity. Reducing the adverse impacts of these hazards on the agriculture sector is highly important, in particular for almost half of the population that reside in rural areas and who are highly dependent on the sector to provide food and generate income.

This document is one of the outputs of the “Enhancement of Disaster Risk Reduction and Management (DRRM) capacities and mainstreaming Climate Change Adaptation (CCA) practices into the Agricultural Sector in the Western Balkans” project (TCP/RER/3504), where the objective is to increase resilience of farming communities to natural hazards, in particular floods, landslides and drought. The project aims to strengthen institutional mechanisms as well as technical capacities of relevant agriculture stakeholders to better plan and implement risk reduction measures in agriculture.

The following document provides an overview of the current strengths, gaps and capacity needs in disaster risk reduction and management for the agriculture sector in the FYR of Macedonia. It includes recommendations for strengthening and enhancing the existing institutional system to build resilience of farming communities to current and future shocks and stresses, such as natural hazards and climate change.

This study has been conducted through the collection of secondary data via a desk study and literature review of relevant policy and strategy documents, reports, articles and databases, which provided insights in to the implementation of disaster risk reduction and management interventions and measures, in particular for the agricultural sector.

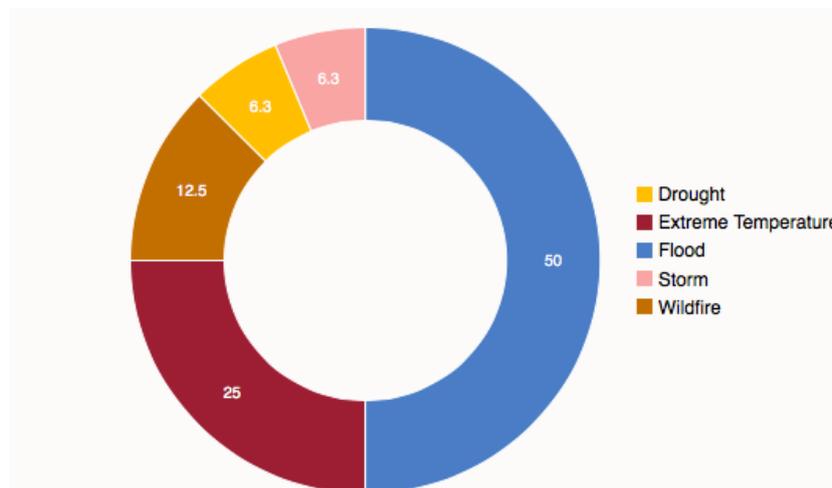
In addition, a questionnaire was developed and disseminated, with the support from the Crisis Management Center, to relevant stakeholders. In total, 7 questionnaires were received from the Ministry of Agriculture – State Strategy Planning, Ministry of Environment – Sector Spatial Planning, State Environmental Inspectorate of the FYR of Macedonia, Public Enterprise for Macedonian Forests, Directorate for Protection and Rescue and the Agency for Food and Veterinary Medicine (see Annex 2). The information from these questionnaires were integrated into the report, in addition to findings from small working group discussions undertaken during a regional DRR learning exchange visit to Ljubljana, Slovenia from 15-17 March 2017.

Furthermore, the findings from the literature review and the questionnaires, were further enriched through the joint FAO-UNDP conference session, which was organised with support from the Crisis Management Center, on 15th of December in Ohrid as part of the International Scientific Conference on “Contemporary Concepts of Crisis Management”. This session brought together over 30 stakeholders from various relevant agencies in the FYR of Macedonia. Participants extensively debated and discussed the challenges and constraints of DRR/M for the agriculture sector in the country (see Annex 3).

Natural hazard profile

The FYR of Macedonia is affected by various natural hazards, including earthquakes, (flash) floods, land (mud) slides, droughts, wild fires and storms. Floods are the most regularly occurring natural hazards, followed by wild fires, droughts and storms as shown by Figure 1.

Figure 1 Frequency of hazard occurrence, 1990-2014



Source: EMDAT-CRED database

Floods, especially river floods, have happened more frequently and intensively during the past decades, as the largest rivers in the FYR of Macedonia, including the Vardar, Crna Reka, Strumica, Treska, Pcinja, Lepenec and Bregalnica have inundated large areas of land and damaging the agriculture and local rural economies. Heavy rainfall in January and February 2015 resulted in the rise of rivers, which led to extensive flooding in 43 out of the 83 municipalities. Around 170,000 people were directly impacted, while almost a million people were indirectly affected.¹ The flooding caused damage to agriculture land as well as drainage and irrigation systems. Another significant flash flood that affected agriculture and agriculture-based livelihoods were the flash floods of June 2004, which impacted 26 municipalities in the upper Vardar, central south and south eastern part of the country. It was calculated that these floods caused over 91 percent in economic losses to agricultural production, especially in the south-eastern part of the country.²

The FYR of Macedonia is among the most arid areas in Europe. The majority of droughts occur in the rural areas of southern and eastern part of the country and significantly affect the agriculture sector. The most vulnerable agricultural zone is the Povardarie region, in particular the areas of the Crna, Bregalnica and Vardar rivers. The exact impacts of droughts on the sector are rarely available, for instance, to what extent the droughts of 2003 and 2006-2007 affected the crop, grasses and fodder production. Often there are no accurate damage and losses figures available of the impact of droughts on agriculture. Although, the extensiveness of the drought of 1993 was measured and most of the crops were damaged, which resulted in a total crop failure that was estimated at 7.6 percent of total national income.³

¹ EC, 2015

² WMO, 2012

³ Ibid.

Another natural hazard that affects the FYR of Macedonia are forest fires⁴, which are caused partly by dry spells as well as human activities. It was estimated that during the 2000-2010 period, almost 100 000 hectares of forests were affected by these fires. In terms of occurrence, a total of 1 191 forest fires were recorded from 1999 to 2005, which resulted in a burned area of 59 500 hectares and an economic loss of over USD 28 million.⁵

Other natural hazards that have impacted the agriculture sector significantly include hailstorms as well as late spring and early autumn frosts. An operational hail storm protection system was established in 1971, however, the system was not able to provide timely warnings and is currently considered as obsolete. In general, it can be said that the likeness of hail storms is higher in the eastern part than in the western part of the country. The frequency of hail is the highest in May, followed by June and July. In terms of agriculture, the regions of Berovo, Demir Kapija, Stip and Strumica in the eastern part of the country, where fruits, vegetables and grapes are produced are often affected by hailstorms, while in the western part of the country, the regions of Ohrid and Resen, where apples and cherries are mainly cultivated are regularly affected. Whereas all agricultural areas in Macedonia are prone to late spring frosts, which often happen from mid April to mid May, and early autumn frosts, which usually occur from early September until the second half of October. These frosts adversely impact the production of fruits, such as apples, plums and cherries, which are produced in e.g. Delcevo, Berovo, Resen, Pretor, Ohrid and Struga, as well as open-field vegetables, including e.g. salad, peppers, tomatoes, cucumbers, cultivated in Strumica, Gevgelija, Demir Kapija and grape production in the three vine-growing regions of Povardarie, Pelagonija-Polog and the Pcinja-Osogovo.⁶

With climate change it is expected that the country's climate will become hotter and moderately drier, with significant reductions in summer precipitation and more frequent and severe extreme events, such as droughts and floods. Differences across regions will include, the largest temperature increase expected in the mountainous north-west region with minimal reductions in precipitation to 2050, while the south-east and central regions are likely to warm at a slightly slower pace, but with greater precipitation reductions, such as a 19 percent expected decrease in summer precipitation by 2100.⁷ Given the importance of spring and summer rainfall for crop flowering and growth, this will pose a serious risk to agricultural production, water availability, food security and economic growth of rural livelihoods in the FYR of Macedonia.

The central and south eastern parts of the country are expected to be mostly affected, and in particular crop and animal production. A decrease of winter wheat will result in reduced food security, since it is an essential staple crop. In addition, a decrease in alfalfa production is expected, which will reduce livestock production and increase the deficit in animal products (milk, meat, etc.), which will further negatively impact food security. The following table 1 indicates the degree of vulnerability per crop and agro-ecological zone and location.

⁴ This document contains some information on forest fires as well as existing structures and measures for forest fire prevention, however within the scope of the document the main focus is on understanding existing capacities and gaps to reduce the impact of floods, landslides and droughts on agriculture in the FYR of Macedonia.

⁵ Ibid.

⁶ The Former Yugoslav Republic of Macedonia, 2007.

⁷ Ministry of Environment and Physical Planning, 2008.

Table 1 Degree of vulnerability per crop and agro-ecological zone and location

Vulnerability	Agro-Ecological Zone and Location	Crop
Most Vulnerable	Mediterranean Zone: Povardarie	Grape
	Mediterranean Zone: Strumica	Tomato
Highly Vulnerable	Mediterranean Zone – Gevgelija: southern Vardar valley	Tomato
	Mediterranean Zone – Skopje: Kumanovo valley	Winter Wheat
	Mediterranean Zone – Ovce Pole	Winter Wheat
Less Vulnerable	Continental Zone: Pelagonija valley	Alfalfa
	Continental Zone: Prespa/Ohrid region	Apple

Source: Ministry of Environment and Physical Planning, 2008

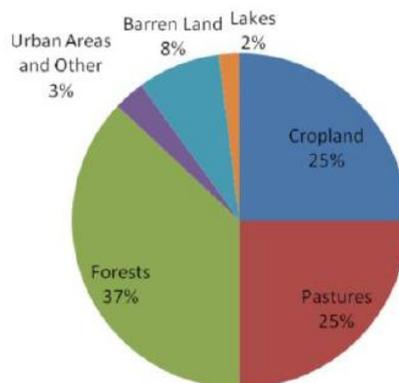
Animal production will be directly and indirectly affected by climate change, as a result of the expected temperature increase that will lead to increased heat stress, while indirectly through forage production decreases and the emergence of animal pests and diseases.

Agriculture profile

The agriculture sector is important to the FYR of Macedonia, in terms of employment, rural livelihoods, food security and exports. The country has a population of over 2 million of which over 40 percent live in rural areas. According to official data, over 5 percent is employed in the sector, of whom almost 30 percent is female.⁸ It is estimated that the agricultural sector’s contribution to the economy is around 10.4 percent.⁹

The total land area is 2.5 million hectares, of which around half of the surface area of the FYR of Macedonia is used for agriculture in the form of cropland and pastures. Forests cover approximately 37 percent of the country, mostly in the largely hilly and mountainous areas.¹⁰ Figure 2 provides an overview of the different types of land use in the FYR of Macedonia.

Figure 2 Land use in the FYR of Macedonia, 2010



Source: World Bank, 2010

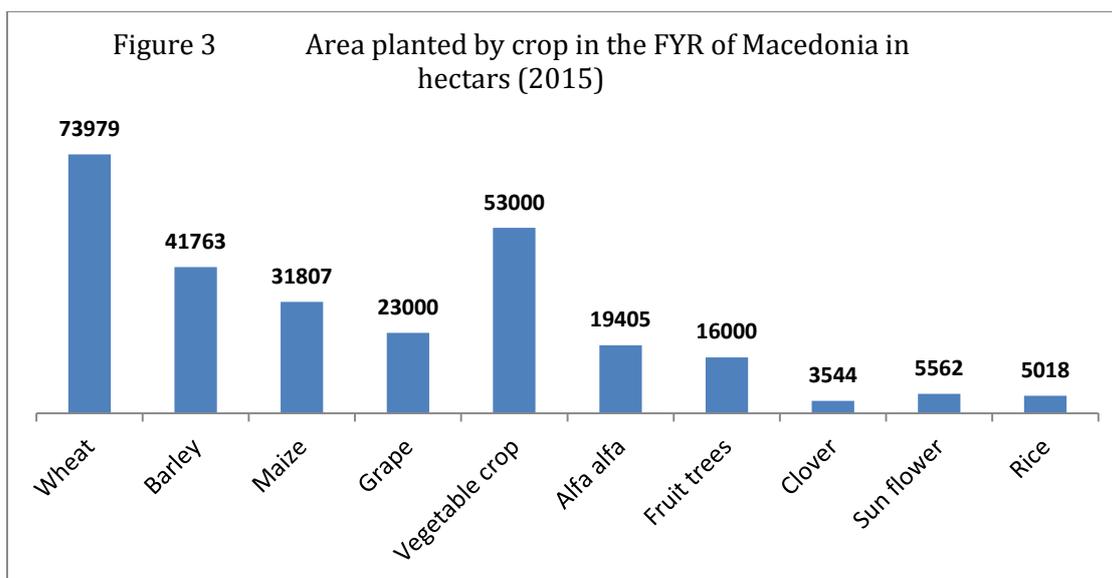
The area of land that is cultivated is primarily the valleys and old lake basins. The major annual crop grown is wheat, followed by barley, maize and vegetable crops, such as tomatoes, peppers and melon, with grapes as the main perennial crop. While wheat, barley and maize are extensively grown, their contribution in terms of value is significantly less than grapes, tobacco, and various fruits and vegetables. Dairy farming with cow milk production dominates the livestock subsector. Smallholder

⁸ FAOSTAT, 2015

⁹ FAOSTAT, 2013.

¹⁰ World Bank, 2010.

farmers typically cultivate cereals, vegetables, fruit trees and livestock for self- sufficiency, while for cash crops they would produce a similar mix in addition to tobacco and grapes. An overview of area planted by types of crops is provided in figure 3.



Source: State Statistical Office of the FYR of Macedonia, 2016

The majority of cropland is rain-fed, with less than 10 percent irrigated. Water deficiencies occur during the summer, which affect summer and annual crops. In an average year, crop water deficits of around 250 mm in western and 450 mm in eastern areas occur, which negatively affect crop production and quality.

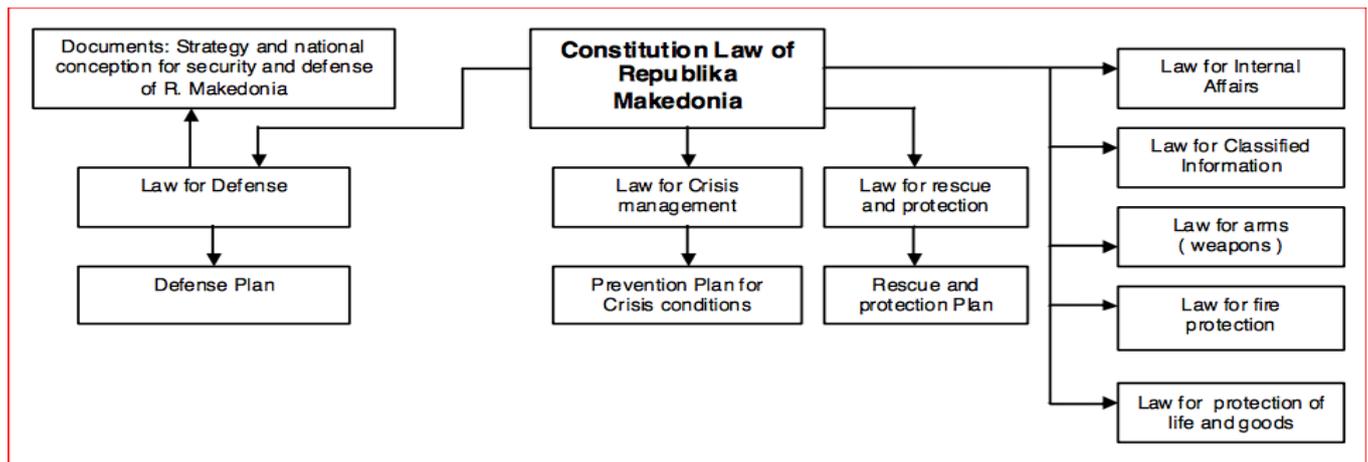
National legislation related to DRR and sectoral plans, policies and strategies

Legal DRR framework

The two main laws relevant for disaster risk reduction in the FYR of Macedonia are the Law on Crisis Management and the Law on Protection and Rescue, which were adopted in 2004 and 2005. The Law on Crisis Management stipulates the response to emergencies with regard to the organization and functioning, decision-making and resource utilization, communication, coordination and cooperation, planning and financing and the security risk assessment to the FYR of Macedonia. This law provides the foundation for the Crisis Management System (CMS), which establishes a Protection and Rescue Directorate (PRD) and the Crisis Management Centre (CMC). Natural catastrophes, like floods, earthquakes and wildfires are included as risks and threats in the Law on Crisis Management.

Whereas, the Law on Protection and Rescue outlines the division of responsibilities between the protection and rescue actors, including the PRD, state authorities, local authorities, private companies and public enterprises, facilities and services. It thus ensures the regulation in terms of the protection and rescues of people and goods against natural hazards as well as epidemics and other disasters. Risk management, including prevention, mitigation, preparedness and recovery is defined within this law. Figure 4, shown below, provides an overview of the legal framework for DRR in the FYR of Macedonia.

Figure 4 Legal framework for DRR in the FYR of Macedonia



Source: WMO, 2012

The municipalities and its mayors have specific duties in the DRR system arising from the Law on Local Self-Government (2002)¹¹ and the Law on Rescue and Protection (2004). The Law on Local Self-Government clearly mentions under article 22 its role and responsibilities in terms of undertaking protection and rescue activities by municipalities during natural and other disasters as well as firefighting activities.

Relevant national plans, policies and strategies for DRR

National plans, policies and strategies that are related to DRR, include among others the 2003 National Security and Defence Concept, the 2008 National Security Strategy, the 2009 National Protection and Rescue Strategy, the 2010 Defence Strategy, the 2011-2020 Long-term Defence Development Plan and the 2012 White Paper on Defence, which outline the FYR of Macedonia's security and defence as well as its protection and rescue policies. These documents describe the roles and responsibilities of relevant institutions, including the Crisis Management Center and the Directorate for Protection and Rescue. Highlighted is also the importance of interdepartmental cooperation and coordination in order to achieve improved security and protection from risks and threats.

Through the Law on Crisis Management, a Prevention Plan for Crisis Conditions is established, while a Protection and Rescue Plan was adopted in 2006, which regulates management, protection and rescue in the local government units, public agencies and services as well as in the private sectors.

The FYR of Macedonia adopted international DRR frameworks, the 'Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters' and its successor the 'Sendai Framework for Disaster Risk Reduction 2015-2030' (SFDRR). The SFDRR is aimed at reducing disaster risk and vulnerabilities to natural hazards. It includes seven global targets, which aim to reduce, among others, the number of people killed, number of people affected, economic losses caused by disasters, damage to critical health and education related infrastructure.

It also includes four priorities for action, namely:

- Priority 1. Understanding disaster risk;
- Priority 2. Strengthening disaster risk governance to manage disaster risk;
- Priority 3. Investing in disaster risk reduction for resilience;
- Priority 4. Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction.

¹¹ http://mls.gov.mk/images/laws/EN/Law_LSG.pdf

The extent of DRR mainstreaming in sectoral laws, plans, policies, strategies

The mainstreaming of DRR in sectoral laws and planning instruments is highly important as political will and public awareness only, are usually not sufficient in order to make disaster risk reduction an underlying principle in all relevant sectors. The mainstreaming of DRR requires the systematic integration of DRR concerns into all relevant areas so that an enabling environment is created in which governance structures can be responsive, transparent, accountable and efficient in the implementation of DRR.

The Law on Agriculture and Rural Development, established in 2013, does not include words like 'disaster risk' or 'disaster risk reduction'. Although it is recognised that adverse climatic conditions can affect the agriculture sector mentioned in several articles, such as article 99 which focuses on the need to provide assistance to farmers whom incurred damages caused by natural disasters. Article 98 focuses on assistance for insuring agricultural assets from natural disasters and article 65 and 73 describe assistance for investments in agricultural infrastructure, which among other things assists in the protection of the agricultural assets from natural disasters. However, climate change as such and natural hazards linked to it, is not mentioned.

The law does include article 76 on sustainable land use, which envisages support for agricultural activities in naturally constrained areas, advancement of the environment, and achievement of animal welfare standards. Support for sustainable forest management and production of seedlings is mentioned in article 71 without further elaboration of the measures. Unfortunately, no link is made to natural hazards, such as that inappropriate land use and forest management can lead to increased vulnerability of risks to natural hazards, such as floods, landslides, drought and forest fires.

A National DRR Strategy and Action Plan was established in 2014, but it has not yet been adopted. The expected increase in frequency and severity of natural hazards, in particular heat waves, droughts and floods, due to climate change is mentioned as well as the expected adverse impact that climate change will have on the agriculture sector, which will lead to direct and indirect agricultural losses. Moreover, the sector is mentioned as one of the three aims of the strategy:

The basic aim of the strategy is to reduce disaster risks in the FYR of Macedonia and to enable sustainable and stable development at all levels via:

- (i) "undertaking joint and systematic activities of institutions in terms of reducing vulnerability and strengthen the resilience of citizens and the state,
- (ii) reducing the exposure of people, material goods, the environment and agricultural crops to hazards,
- (iii) improving preparedness to deal with natural disasters and catastrophes."¹²

DRR is a cross-sectoral issue, however, there is some mainstreaming of sectors, including agriculture, in this DRR strategy and action plan, although it is quite limited. The results section of the document, includes 4 main components: 1) inclusion of DRR in sectoral policies and the strengthening of institutions, capacities, skills and resources to reduce disaster risks; 2) establishing a comprehensive and effective early warning system; 3) build a culture of prevention; and, 4) install an efficient model for the transfer of disaster risk, which mentions insurance only in a general manner.

In addition, the DRR strategy and action plan is linked to other national legislation and policies, such as the National Strategy for Sustainable Development, the Programme for Sustainable Development of Local Governance and Decentralization 2015-2, the National Strategy for Protection and Rescue

¹² Crisis Management Center, 2014:13.

2014-2018 as well as the Law on Local Self-Government, however, agriculture related legislation and planning documents are not included.

The current National Strategy for Agriculture and Rural Development (NARDS) 2014-2020, in contrast to the previous Agriculture Strategy of 2007-2013, recognizes the increased risk of extreme weather events and views climate change as a threat to the sector. It also acknowledges its adverse impact on agriculture subsectors, such as crop, livestock and forests. It envisages support for measures for reducing vulnerabilities of smallholder farmers, although not many measures are listed. It mainly mentions the need to enhance awareness and sustainable resource management as well as pledging support for climate change adaptation and mitigation.

DRR/M is not mentioned as a self-standing outcome, strategy or priority area within the document, but some agricultural prevention and mitigation measures are part of ongoing initiatives such as regarding insurance. For instance, the inclusion of the South East Europe and Caucasus Catastrophe Risk Insurance Facility (SEEC CRIF), a project funded by the World Bank to help increase access of homeowners, farmers, the enterprise sector, and government agencies to financial protection from losses caused by climate change and geological hazards in Serbia and the FYR of Macedonia. One of the project's component is Area Yield Index Insurance (AYII), which is primarily aimed at agricultural insurance development for farmers. In addition, there is mentioning of the need for increased irrigation to tackle drought issues and the United States Agency for International Development (USAID) funded project 'Adaptation to Climate Change in Agriculture', which aims to promote agriculture development, raise awareness and increase farmer's coping capacity to the impacts of climate change.

The previous strategy primarily focuses on the alignment with EU policies with regard to rural development and agri-environmental policy and the need to enhance farm-level data, increase expertise in the areas of agri-environmental practices and rural development. The document did include certain natural hazards, such as droughts and forest fires and its impact on agricultural production. When comparing both strategies, the current clearly acknowledges and outlines the need to tackle climate change and associated risks. However, the strategy lacks systematic DRR mainstreaming, which as a specific structure is absent, in particular in assigning responsibilities to certain stakeholders. It also fails to set up a monitoring structure for DRR as a clear goal to be achieved or measured as well as mentioning specific agriculture prevention and mitigation measures that can reduce the adverse impacts of natural hazards and climate change.

It mentions the importance of the role of forests in reducing the impacts of relevant hazards, such as forest fires, soil erosion and climatic extremes as well as in reducing underlying vulnerabilities, like addressing degraded forests through reforestation and afforestation. Natural hazards are included in one of the strategic goals of the forest protective function. A few prevention and mitigation measures are stated, such as early warning systems for forest fires and research and monitoring activities to better understand climate change impacts on forests and their ability to reduce the adverse impacts of extreme weather events. Overall, the document's emphasis is primarily on the role of forests within the context of climate change mitigation through their ability to store carbon and therefore removing and reducing greenhouse gas emissions. According to one of the questionnaires, the development of an operational programme for forest fire protection is currently being planned.

Planning and strategy documents, such as the National Development Plan 2007-2009 and the 2008 National Strategy for the Sustainable Development do not mention disaster risk reduction or natural hazards as such. It focuses on sustainable development with regard to natural resources management and environmental protection, such as the prevention and control of pollution, protecting and exploiting nature sustainably. No link is made between sustainable development

within the context of climate change or any linkages between environmental and land degradation, including deforestation and the increasing vulnerability to natural hazards. In the National Development Plan, natural hazards and climate change are viewed as a threat, but inclusion of specific measures to reduce this threat are absent. With regard to the agriculture sector, only animal pests and diseases are mentioned within the context of potential transfer of these diseases to humans and the impact on human health.

Main stakeholders, roles and responsibilities for DRR/M at all levels

The Law on Crisis Management (2005) establishes the two main institutions for disaster risk reduction, namely the Protection and Rescue Directorate (PRD) and the Crisis Management Centre (CMC).

The Protection and Rescue Directorate (PRD) has the responsibility to coordinate protection and rescue activities among the sectors of civil protection and fire protection. Its tasks are aimed at prevention and mitigation of impacts caused by natural hazards or other emergencies, which endanger the population, flora and fauna, common goods and facilities etc.

The PRD operates on three levels: at the national level, the directorate director manages the main headquarters, which, through rapid response teams, is involved in protection and rescue activities. At the regional level, the regional headquarters are involved via a decision issued by the Directorate Director and includes staff from the directorate, experts from state authorities, public agencies or institutions. At the municipal level, protection and rescue operations are conducted through the councils of administration, with the mayors proposing protection and rescue plans, involving protection and rescue forces and undertaking preparedness activities. Below the municipal level, various actors can be involved, such as professional fire-fighters, private companies and some public enterprises.

The Crisis Management Centre (CMC) is an independent state administrative body, which is in charge of strategic decision making in the event of a crisis. It has the responsibility to coordinate the crisis management activities, which includes:

- Ensuring effective inter-agency, international coordination and cooperation with regard to the management of a crisis;
- Issuing timely information and early warnings;
- Proposing measures and activities for resolving a crisis situation;
- Making efficient and appropriate use of available capacities and resources in the event of a crisis, and;
- Preparing and updating national security risk assessments.

The CMC has 35 regional crisis management centers (RCMC), which are grouped into eight main RCMC and 27 smaller RCMC, which cover 85 municipalities. These centers are responsible for the exchange of information and data, monitoring of situations, preparation of assessments and the broadcasting of alerts and warnings to the population. With regard to the issuing of timely information and early warning, which is one of the responsibilities of the CMC, it works closely with the Hydrometeorological Service of the Republic of Macedonia.

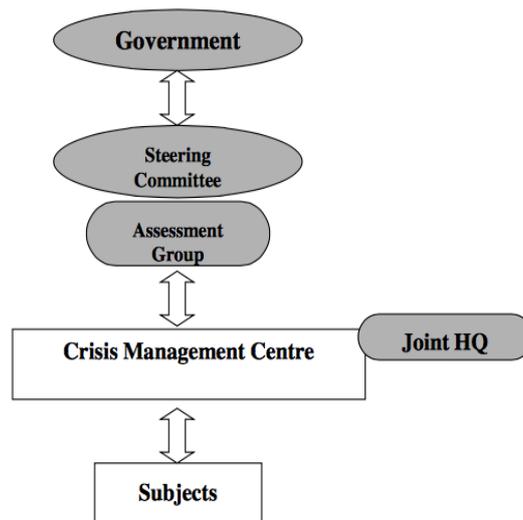
The CMC is also in charge of the administrative-expert support of the Steering Committee (SC) and Assessment Group (AG). The SC reviews the proposals to the government on whether there is a crisis situation and the AG conducts risk assessments and proposes preventative, early warning and recovery measures.

Besides the CMC the following stakeholders are 'subjects' in the CMS e.g.:

- Ministry of Interior;
- Ministry of Foreign Affairs;
- Ministry of Defence;
- Ministry of Finance;
- Ministry of Transport and Communication;
- Ministry of Health;
- Ministry of Agriculture, Forestry and Water management;
- Ministry of Environment and Physical Planning;
- Ministry of Economy;
- Ministry of Local Government;
- Ministry of Labour and Social Affairs
- Hydrometeorological Service
- Intelligence Agency;
- Macedonian Army;
- Education and Academic institution;
- Municipalities;
- Public and private enterprises and agencies engaged in Crisis Management.

An overview of the organization and the functioning of the crisis management system is shown in the below figure 5.

Figure 5 Overview of institutions of the Crisis Management System



Source: Crisis Management Center, 2012

The National Platform for Disaster Risk Reduction, established in 2009, is based on several national legal and policy documents, including the National Conception for Security and Defence and the National Security Strategy, as well as the Law on Crisis Management, which strives to provide continuous consultations, high-level decision making and maximum coordination of the disaster risk reduction and management process.

The platform provides networking of stakeholders dealing with prevention and management of accidents and disasters. This networking established cooperation among all stakeholders in the country dealing with crisis management. A number of cooperation memorandums were signed with all ministries, governmental agencies, municipalities, public enterprises and services, NGOs, academic institutions, universities, research centers and laboratories, as well as with the business

community and religious communities. As a result, the National Laboratory Network and the National Network of Experts were included as part of the national platform.

Furthermore, three Advisory Councils were established within the context of the national platform, including the 1) Legal, the 2) Economic-Social, and the 3) Academic-Expert Councils, which bring together the highest decision-makers in the respective areas with top representatives of the academic and business communities as well as the NGO sector.

The National Platform is organized at both the national and local levels. At the local, Local Councils of the National Platform assess local risks and threats, coordinate resources and activities, organize rural and urban communities. They maintain regular communication with the Mayor and the Crisis Management Center, monitor risk conditions in the communities, inform and prepare citizens for response as well as coordinate community activities in the event of accidents or disasters. When the situation exceeds municipal boundaries, Regional Councils of the National Platform are established, which cover several municipalities that are located near each other.

Depending on the type of risk, seven specialized platforms have been established and headed by competent ministries. Each of the platforms has its coordinative council presided by the minister in charge of the competent ministry and each of the platforms has a number of national commissions for prevention and risk and threat management. For instance, a relevant platform is the platform on 'Risks in the domain of agriculture, forestry and water management, which is coordinated by the Minister of Agriculture, Forestry and Water Management.

Furthermore, there are thematic working groups, which represent a special part of the National Platform for DRR. These working groups relate to issues and problems that are interdisciplinary in character and thus are of interest to various government and non-government organisations at both local and national levels, and are linked to two or more specialized platforms. Relevant thematic groups for the agricultural sector include those on 'climate change', 'repercussions and adaptation', 'forestation', 'early warning', 'media and public awareness' and 'coordination with insurance companies'.

However, with the third revision of the National Platform, adopted in July 2011, the abovementioned specialized platform concept has been removed. However, discussions with the Crisis Management Center indicate that although not specifically listed in the third document on the National Platform, the specialized platform exists and the relevant ministries are involved, although it is not so clear as to what extent.

The Ministry of Agriculture, Forestry and Water Economy (MAFWE)

The Ministry is the leading institution in the agricultural policies and planning through its Programme for financial support for agriculture, the Programme for financial support for rural development and through the Instrument for Pre-Accession Assistance in Rural Develop (IPARD). IPARD promotes the implementation of different measures, which aim to reduce natural hazards like floods, soil erosion (landslides), droughts, such as usage of tilling techniques, drip irrigation, drainage systems and other measures, which are adopted and included in the Rulebook for Good Agricultural Practice and the Guide to Cross Compliance for the implementation of specific minimum requirements for Good Agricultural Practice and Environmental Protection. Although a specific disaster risk reduction measures that aim to prevent and mitigate the impact of e.g. floods, landslides on agriculture are currently not in place. Also there are no specific measures in the above mentioned Programmes regarding drought. It is not clear whether DRR is coordinated across the different departments as it is a cross-sectoral issue.

Beside the Minister, Deputy Minister, the State Secretary and the Unit for Strategic Planning, the Ministry of Agriculture, Forestry and Water Economy consists of the following sectors:

- Sector for internal audit – independent unit;
- Sector for financial issues;
- Sector for violations;
- Sector for legal issues;
- Sector for human resources;
- Sector for agricultural policy analysis;
- Sector for coordination and technical assistance to Minister’s cabinet;
- Sector for international cooperation, and;
- Sector for European Union.

The Ministry has 13 state advisors for specific areas, such as:

- State advisor on agricultural policy analysis
- State advisor on strategic planning
- State advisor on international cooperation and EU
- State advisor on rural development
- State advisor on agriculture – livestock breeding and fishery
- State advisor on agriculture – plant production
- State advisor on land policy
- State advisor on forestry and hunting
- State advisor on water economy
- State advisor on legal issues
- State advisor on seeds and seedlings
- State advisor on communication and public relations
- State advisor on organization and coordination of regional offices.

The Ministry further consists of 11 organisational units, including:

- Sector for viticulture, wine and orchards;
- Sector for agriculture;
- Sector for forestry and hunting;
- Sector for rural development;
- Sector for information technology;
- Sector for coordination of regional units;
- Sector for registration, management, promotion and sale of state-owned agriculture land;
- Sector for forest police;
- Sector for marketing and agriculture product quality;
- Sector for management of EU pre-accession funds for rural development (IPARD);
- Sector for consolidation of agricultural land, exchange and identification of land parcels.

In addition, the Ministry further incorporates ‘associated agencies’, namely:

- Phytosanitary Directorate;
- Seeds and seedlings Directorate;
- State phytosanitary laboratory, and;
- Water Economy Directorate.

The document “Standard Operating Procedures for communication, coordination cooperation between the subjects of management system in crisis situation” was adopted by the government on 21th December 2012. The following activities are outlined by this document:

- Activate operational plans and internal procedures for dealing with a crisis situation, which are currently not yet developed or drafted;
- Activate forest resources with regard to energy;

- Monitor and analyse meteorological and hydrological phenomena and processes;
- Monitor the daily weather in the FYR of Macedonia and conduct weather forecasts for next 3-5 days;
- Monitor and manage the water pollution situation;
- Monitor and study the water conditions, maintain and improve the water regime;
- Monitor and manage irrigation systems;
- Provide flood warnings/alerts through the HMS;
- Monitor the level and quantity of accumulated water in the reservoirs, and the amount of water entering and discharging;
- Organize and take measures to prevent an emergency, spread and destruction of plants pests;
- Following the occurrence, spread and prevalence of plant pests based on meteorological, biological and other data;
- Assess and diagnose plant pests;
- Determine the optimal ways to destruct the plant pests;
- List and map the flood plains, wetlands, coastal land of lakes and reservoirs and other water systems;
- Determine the type of pests, vocational and proper use of the means of plant protection and proper use of the equipment for treatment;
- Record the occurrence of plant pests that cause significant economic damage, the measures taken for their destruction and the amount of damage caused and the collection and use of meteorological data that are important for monitoring the occurrence, spread and destruction of plant pests;
- Detect and determine harmful organisms;
- Destruct or remove otherwise marking the site of the presence of harmful organisms, taking measures - providing treatment and / or other relevant measures (treatment with agents to suppress disease);
- Carry out regular and systematic checks for the presence of harmful organisms with respect to the protected zone that has been defined as such;
- Monitor, forecast, determine protective measures against harmful organisms;
- Analyse and evaluate the health status of plants in order to define the emergence and spread of harmful organisms in the country;
- Strengthen the control of the movement of people through the woods.

Within this document there is a part on flood management where the Ministry of Agriculture is in charge of certain defined activities, regarding emergency response and other measures to minimize the impacts of floods as well as reporting. However, there are no designed preparedness activities related to the identification of evacuation routes for livestock identified in case of floods or activities related to the prevention and mitigation of plant pests and diseases during and after floods. There are no procedures or any kind of produced documents related to DRR or DRM in the Ministry related to floods, droughts, landslides etc.

A strategy planning unit within the Ministry is present, which is in charge of communication with the Crisis Management Center (CMC). There is a rulebook for emergency response to crises situations (fire), which does not include agriculture related prevention, mitigation and preparedness activities. Civil servants within the Ministry are in charge of the communication with the CMC in the crisis situation. The Crisis Management Center has developed a document for “Assessing the vulnerability of the areas of security of the Republic of Macedonia”¹³, including the presence of a database for hazards and risks.

¹³ In the official gazete No 13/12 (from 2012) the “Decree for methodology for preparation of the assesement of the threat of the security of the FYR of Macedonia from all risks and hazards” is published.

The below table outlines a SWOT analysis for MAFWE regarding DRRM for agriculture.

Table 2 SWOT analysis of MAFWE

STRENGTHS (+)		WEAKNESSES (-)	
1	Regional offices	1	DRR strategy for agriculture and action plan does not exist
2	Available staff	2	Limited awareness about DRR
3		3	Limited knowledge of DRR for agriculture
4		4	Division of responsibility regarding DRR
5		5	Methodology (Procedure) for DRRM
6		6	PDNA Methodology
7		7	PDNA Software
8		8	Recovery strategy and action plan
9		9	Programming of preventive and mitigation measures as part of the Agricultural policy
OPPORTUNITIES (+)		THREATS (-)	
1	Support to farming population	1	Limited budget
2	Reducing and minimizing the effect of natural hazards	2	Limited inter-institutional communication

Food and veterinary agency

The Food and Veterinary Agency, works as the sole competent authority for the control of food safety and animal feed, control, supervision and monitoring of veterinary activities in the field of animal health, welfare, veterinary public health and control of laboratories that provide support to the Agency. Within the context of the EU funded IPA TAIB project "Capacity building of competent authorities for food safety, veterinary and phytosanitary policy" that the Food and Veterinary Agency in 2015 implemented, the following related results included:

- Improvement of the crisis management system;
- Development of the Operational Procedures manual for risk assessment;
- Manual for risk management;
- Development of the Operational Procedures manual for risk communication, risk evaluation and a risk communication strategy;
- Revision of the crisis management plan;
- Development of the Operational Procedures for the implementation of the crisis management plan in terms of food safety and animal feed (e.g. procedures, requirements for establishing a plan for immediate action etc.).

The above mentioned results of the implemented project are linked to crisis management, but it is not clear to what extent it covered crisis management of natural hazards and disaster risk reduction.

The Food and Veterinary Agency has a Programme for prevention and suppression of infectious animal diseases, for which general measures and activities are implemented to prevent and control the spread of these infectious diseases, such as:

- Competencies, administrative structure, chain of command and information flow;
- Available resources, in terms of human, financial and materials;
- Establishment of the National Center for Disease Control and Prevention;
- Establishment of experts group, and;
- Staff training, public awareness and sharing of information to the public.

Contingency plans available for the following diseases:

1. Classical swine fever;
2. African swine fever
3. Avian influenza;
4. Blue tongue;
5. Foot-and-mouth disease.

According to the operational plan for dealing with flooding and other damage cause by floods, the Food and Veterinary Agency successfully deals with the newly emerged conditions that are favorable to the occurrence and spread of infectious diseases, primarily anthrax, and enterotoxaemia. Anthrax is a particular threat due to the possibility of its transmission from animals to humans. For these reasons, emergency vaccination is provided to sheep, goats and cattle in the flood affected regions. Simultaneously safe removal of contaminated feed and increased disinfection of holdings and recommendations are given to the owners and breeders of animals in terms of protection and animal welfare.

The National Extension Agency (NEA)

Extension services and advice is provided by the National Extension Agency. The NEA was founded by the Law on National Extension Agency (Official Gazette number 3/98). This was undertaken with support from a World Bank project for advisory service reforms in the FYR of Macedonia in line with the country's agricultural development strategy 1995-2010. As a result, individual Development Centers were converted in a single national advisory institution.

In 2005 another reform was undertaken, which shifted the NEA's headquarters to Bitola to be nearer to the farmers. It consists of 30 units that are clustered into 6 regions with regional centers, with 38 advisors with expertise in different types of agriculture production throughout the country.¹⁴ The NEA's activities are focused on e.g. crop farming, livestock breeding, vine and fruit cultivation, vegetable production and agro-economics. One of the main activities of the NEA is knowledge transfer and the provision of advisory assistance and information to individual farmers and associations based on the demand, regarding the practical implementation of certain practices and technologies. Some of the measures promoted focus on prevention and mitigation, but there is still scope to enhance and promote more DRR related measures to reduce the impact of floods, landslides and droughts as well as within the context of climate change among others. In general, the Agency offers technical information for enhancing the quantity and quality of agricultural production and maintains and updates the Farm Monitoring System, which is a system that provides information on the financial aspects of agricultural production, including profitability and economic efficiency.

¹⁴ FAO, ?

A SWOT analysis is undertaken and shown in the below table 3.

Table 3 SWOT analysis of NEA

STRENGTHS (+)		WEAKNESSES (-)	
1	Well spread advisory network throughout the country	1	Limited awareness about DRR/M
2	Good linkages with farmers	2	Limited preventative and mitigation measures in the advisory packages
3	38 advisors in the field	3	Limited knowledge of DRRM, PDNA etc.
4	Covering different crop and plant production services	4	Limited linkages with Hydromet Services
5		5	Limited linkages to Crisis Management Center
6		6	Limited financial resources for current obligations
7		7	Limited linkages between researchers and education system with advisory system
OPPORTUNITIES (+)		THREATS (-)	
1	Allocation of budget for DRRM purposes	1	Limited budget or not allocated for DRRM purposes
2	Increase public awareness on DRR/M and inclusion into the DRRM system	2	Limited public awareness to be included in the DRRM system
3	Organization of trainings and workshops for DRRM		
4	Increase the cooperation between researchers and advisors		

Institute of Agriculture

The Institute of Agriculture is aiming to conduct high level scientific research, which is applicable in the field. It conducts research with regard to plant production on an area of around 360 hectares and primarily focuses on seeds, seedlings production and includes services, such as soil testing, conducting diagnoses related to the protection of plant health and identifying quarantine diseases.

The Institute of Agriculture consists of the following departments:

- Department for field crops and vegetable production
- Department for fruits and orchards
- Department for viticulture and wine production
- Plant protection Department
- Soil and nutrition Department
- Department for economic analysis and project planning

The institute has a team of over 40 scientists, researchers and support staff. It is focusing on finding solutions for current agricultural problems in the FYR of Macedonia, thereby using methods that are socially, financially and environmentally sustainable as well as trying to apply the latest technologies and approaches.

The Ministry of Environment and Physical Planning (MEPP)

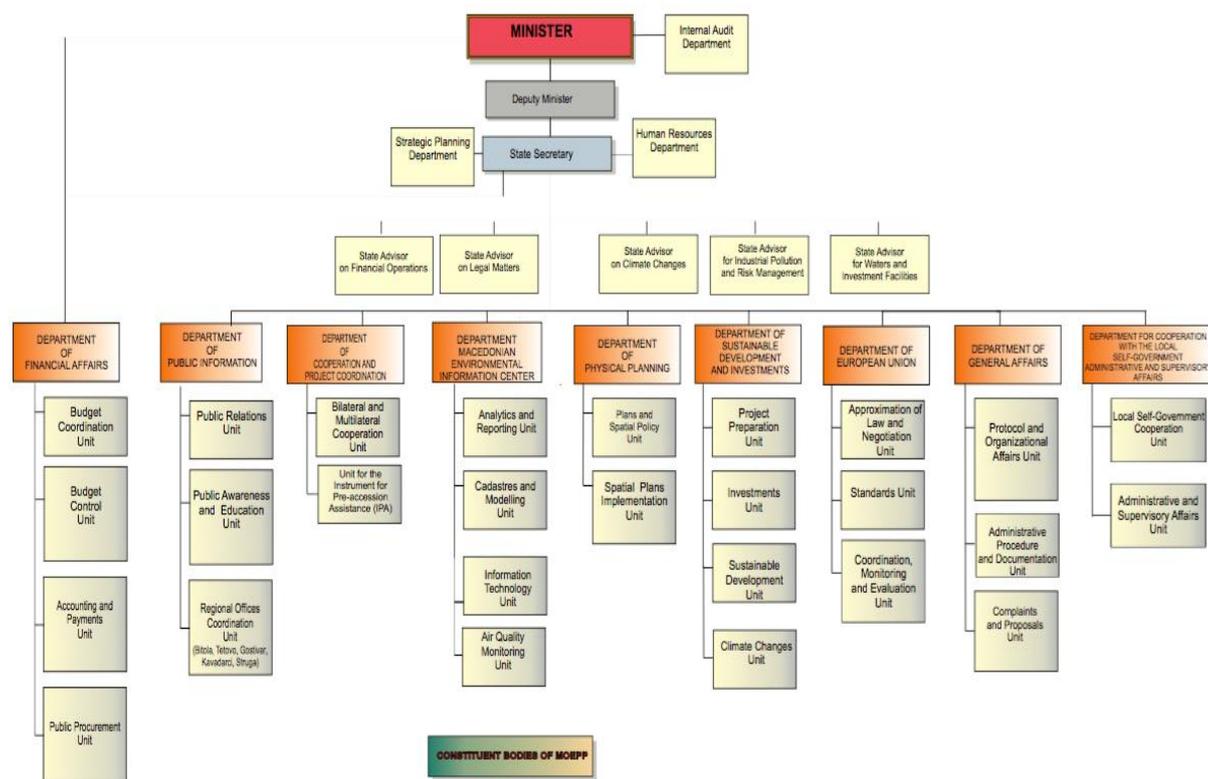
According to the Ministry's website, the Ministry of Environment and Physical Planning is involved in environmental protection related activities, including e.g. monitoring environmental conditions; protecting water, soil, air, flora and fauna from pollution, radiation and noise as well as protecting of biodiversity, national parks and protected areas; restoring polluted areas; implementing solid water management measures and conducting physical planning.

The Ministry was established with the aim to protect human health and the environment by developing and enforcing regulations based on the relevant laws. Climate change is one of the issues the Ministry is dealing with, besides soil, water, air and nature.

With regard to climate change, the Ministry is the main institution responsible for climate change policies and the national contact point for the United Nations Framework Convention on Climate Change (UNFCCC). The Law on Environment makes no link between climate change and drought impacts as it is separately mentioned in different articles. Articles 191 and 192 mention the establishment of a national plan and action programme on combating desertification and mitigating drought effects. It includes the promotion of awareness raising and educational activities as well as professional training of scientific, technical and managerial staff. In addition, specific measures for providing timely warning against droughts, in order to reduce and mitigate the adverse effects of droughts. In this regard, responsibility is placed on the state agencies responsible for environmental affairs and agriculture, forestry and water management.¹⁵

In the outlined structure of the MEPP as shown in Figure 6, there is a State Councilor for Climate change as well as a State Councilor for Industrial Pollution and Risk Management, which is responsible for coordination of e.g. strategies, media communication, convention ratifications, action plan development, projects and reporting.

Figure 6 Organigram of Ministry of Environment and Physical Planning

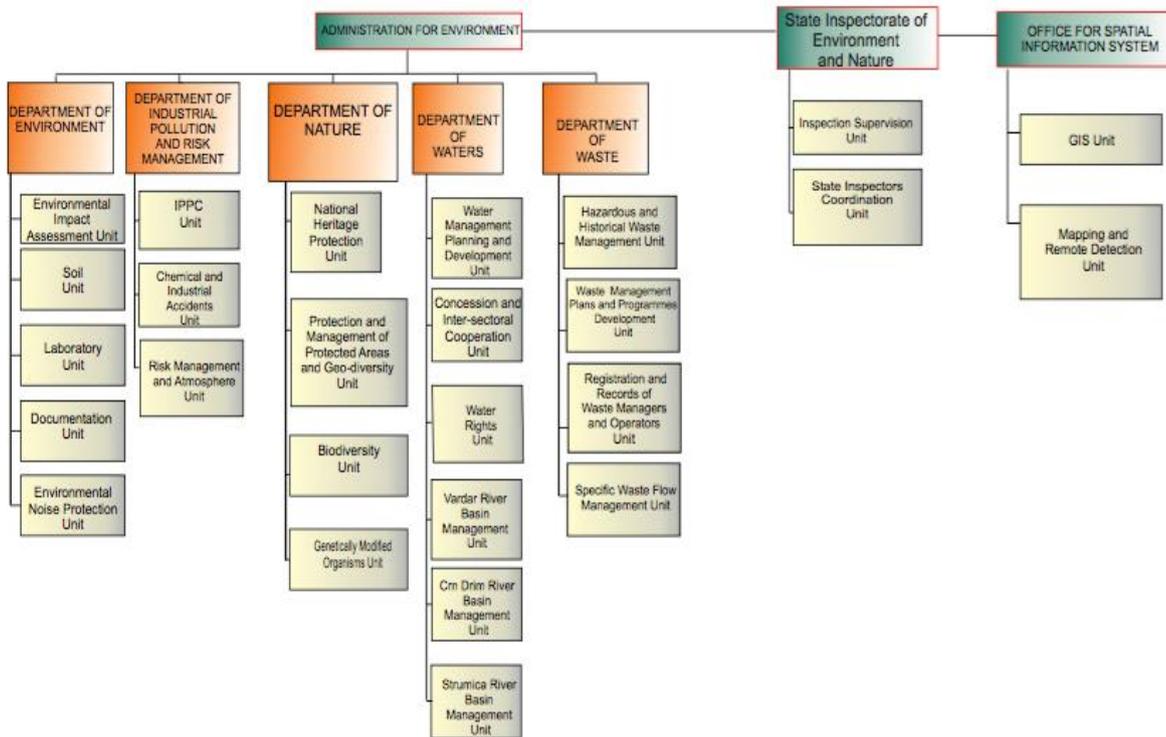


Source: Ministry of Environment and Physical Planning

The organigram outlined in figure 7, provides an overview of the constituent bodies of the MEPP, there is the Department of Industrial Pollution and Risk Management and the Risk Management and Atmosphere Unit. This unit is mostly focused on risk management from industrial facilities on the environment, in particular with regard to controlling and monitoring of pollution levels.

¹⁵ Ministry of Environment and Physical Planning, 2005

Figure 7 Overview of the constituent bodies of the Ministry of Environment and Physical Planning



Source: Ministry of Environment and Physical Planning

Municipalities

When a disaster occurs, municipalities, including the city of Skopje, which is a separate unit of local self-governance, act as the first responder. These municipalities have responsibilities with regard to emergency response, protection and rescue. They are involved in integrated risk and hazard assessments, conducting damage and loss assessments and cooperate with other local entities in protection and rescue activities. According to the Law on Water, the municipalities are responsible for the preparation as well as adoption of the operational plan for the protection and defense in the event of a flood. In addition, they are involved in indicating areas that are vulnerable or impacted by erosion and implementing erosion mitigation and torrential flood prevention measures.

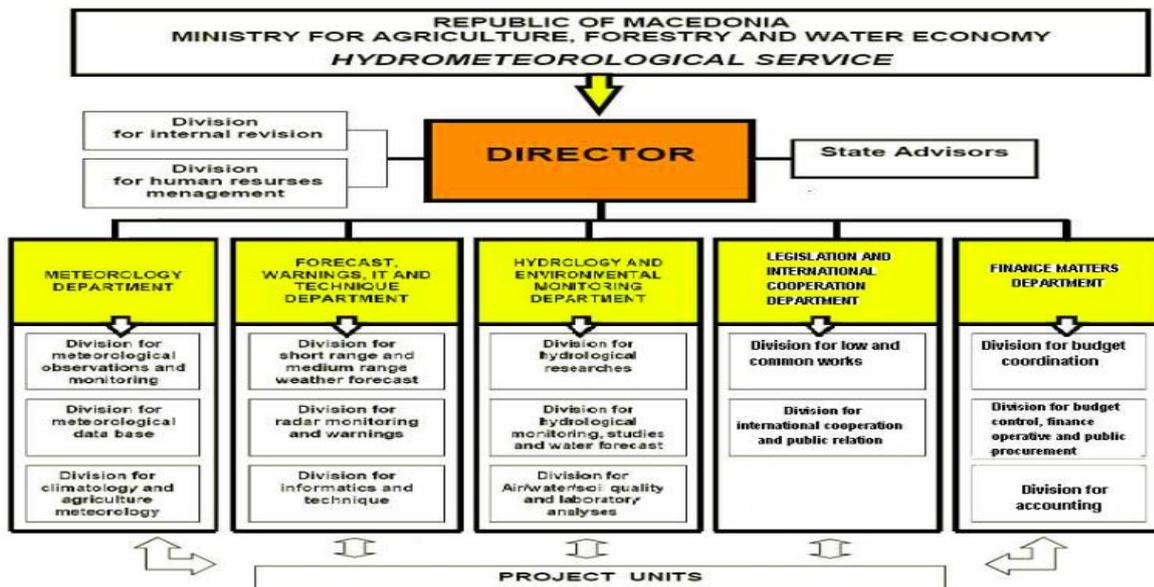
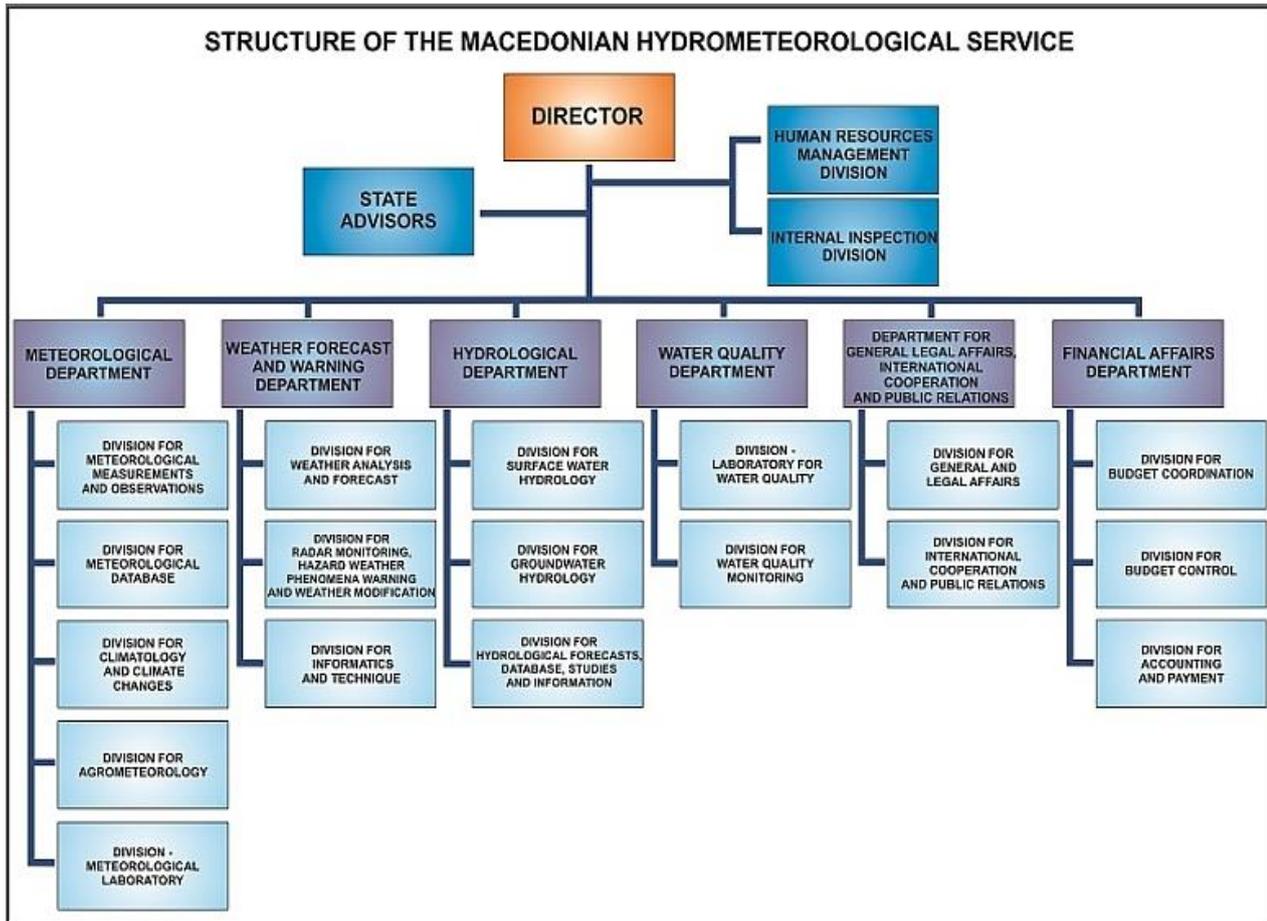
Water Management JSC Vodostopanstvo

This company was established in 2015 and has the aim to execute water management services, including the use, maintenance and management of irrigation and drainage systems. Moreover, Vodostopanstvo is involved in the construction and maintenance of the flood and erosion protection facilities as well as is managing river beds and torrents.

Functioning of the early warning system

The Hydro-meteorological Service (HMS), established in 1947, has been the authority for hydrology and meteorology since 1991. From 2000 onwards, HMS is part of the Ministry for Agriculture, Forestry and Water Economy, which is overseen by the Ministry of Environment. HMS consists of 6 main departments and 2 main divisions, which is displayed in Figure 8.

Figure 8 Organisational structure of HMS



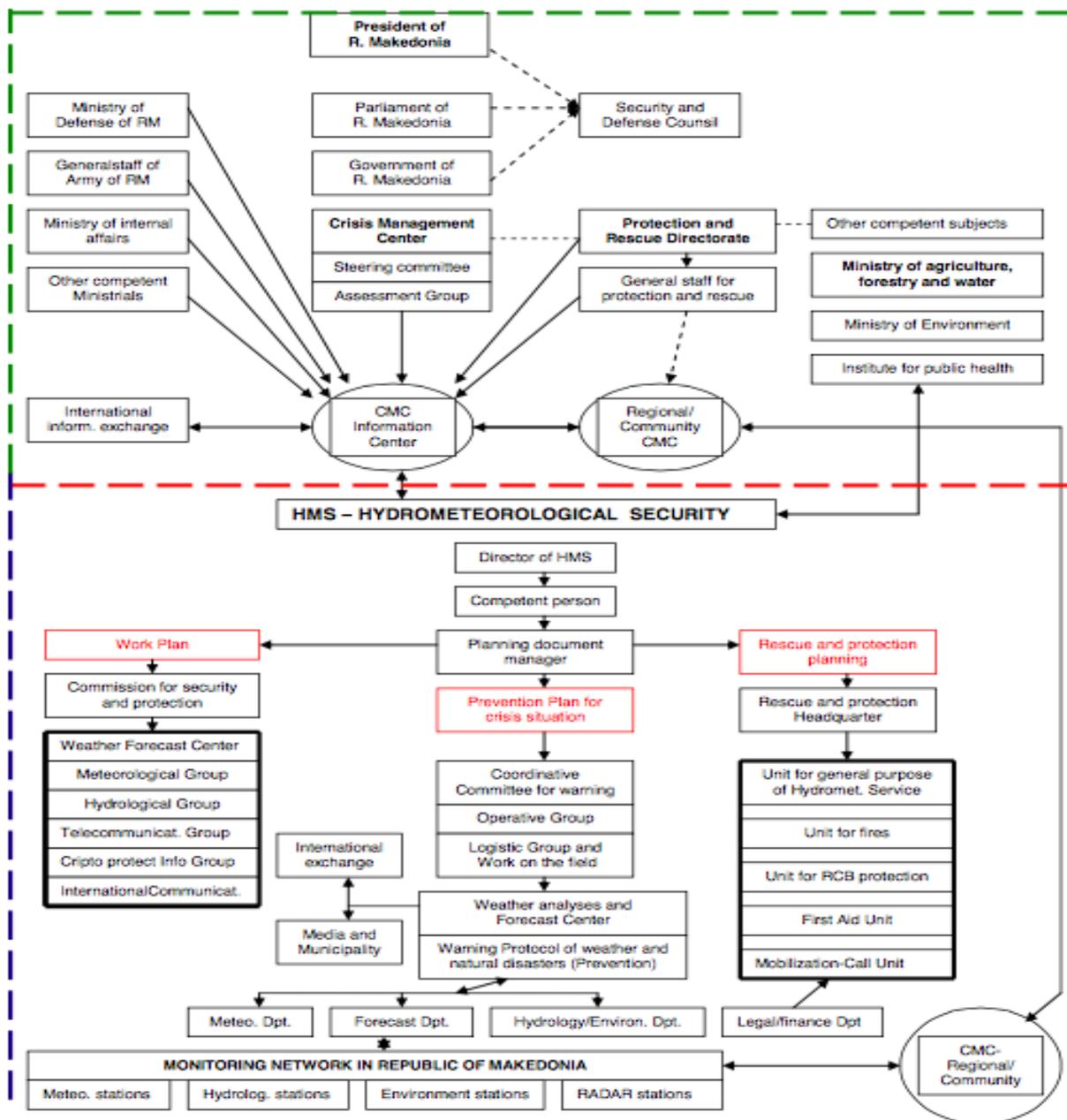
Source: WMO, 2010

HMS's mandate and roles are defined by the Law of Hydrometeorology Activity, which states that its responsibility to operate the observation network and provide meteorological and climatological services. Among its activities, include hydro-meteorological monitoring, conducting research on the atmosphere, climate, water and soil and providing basic information regarding meteorology, hydrology, air and water quality.

In terms of inter-institutional communication, coordination and cooperation, standard operating procedures (SOPs) exist for the CMC / PRD and the subjects of the CMS for flood protection. An

overview of a SOP within the CMS is provided in Figure 8, which shows the information flows between the HMS and the CMC as well as other relevant stakeholders, such as the Ministry of Agriculture, Forestry and Water.

Figure 9 Overview of information flows between HMS and the Crisis Management System



Source: WMO, 2010

Other organisations that are involved in hydrology, water for river lakes and groundwater include the Ministry of Environment and Physical Planning; Water Economy Directorate – Ministry of Agriculture, Forestry and Water Economy; the National Institute of Health Protection, Water Development Institute and the Hydrobiological Institute.

Hydro-meteorological services to support disaster risk reduction and management

The hydro-meteorological observation network of HMS consists of 20 meteorological manned synoptic stations and 2 automatic weather stations (AWS), which collect data every hour and it has 24 agrometeorological stations. The majority of the equipment used at the manned stations require

replacement by new sensors. HMS uses satellite data primarily for weather forecasting, not for drought monitoring and lacks the capacity to analyse digital data. The network of HMS is also part of the World Meteorological Organization (WMO) Global Observation System (GOS), however, it does not possess adequate calibration systems, which results in the measurements not meeting the WMO standards.

HMS develops 12-hour, 24-hour, 2-day, 3-day and 5 day-weather forecasts and from time to time it develops tailor-made weather forecasts for the agriculture, water management and health sectors as well as for the CMC, PRD and fire brigades. HMS issues warnings, based on observations, numerical weather predictions, radar and satellite data for various natural hazards, see Table 4.

Table 4 Warnings issued for natural hazards in the FYR of Macedonia

Hazard	Warning issued by
Cold wave	HMS
Drought	HMS
Earthquakes	Seismologic institute
Flash floods	HMS/CMC
Forest / wildland fire	MAFWE/CMC
Hailstorm	HMS
Heat wave	HMS
Heavy precipitation	HMS
Landslide / mudslide	CMC
River flooding	HMS
Storm wind	HMS
Tornado / cyclone	HMS

Source: WMO, 2012

The data, forecast products and warnings collected and issued by HMS are freely disseminated through phone or email to the relevant organisations and are accessible at the CMC in real time. These warnings are disseminated to the public through the media, such as via the weather forecasting bulletins on radio and television. Alerts and real time data are also available through HMS's web page. Some tailor made products are provided to the CMC and PRD, however, there is no feedback mechanism to ensure that information is relevant to the needs of the users.

Previously, the local units of the Ministry of Agriculture, Forestry and Water Economy freely disseminates crop condition data to the HMS agrometeorological Division, once a week by phone. However, this is currently no longer practiced. The FYR of Macedonia is part of the European Commission (EU) Joint Research Centre's (JRC) crop forecasting activities, which assesses the impacts of climate change on agriculture as well as it delivers scientific advice and early warning on agricultural production in food insecure areas.

Disaster risk assessments

The overall responsibility for a disaster risk assessment lies with the National platform, however both the Law on Crisis Management and the Law on Protection and Rescue are outlining the requirement of conducting risk assessments and are supported by the respective methodologies. The Law on Crisis Management states that an assessment of all hazards should be undertaken by special methodology and is obligatory only for local municipalities. However, the Law on Protection and Rescue requests the development of risk assessments for natural and technological hazards,

undertaken by a different methodology per type of entity and obligatory to all public and private institutions, including local municipalities.

With a governmental decree the methodology for the assessment is prescribed, however as there is insufficient technical knowledge and expertise for all risks and hazards assessment, including those related to agriculture, as well as the lack of an integrated approach to disaster and climate risk management, both on national and local levels, the United Nations Development Programme (UNDP) provided the FYR of Macedonia with support in this area.

Through this UNDP project implemented in 2011, the following, among others, were prepared 1) guidelines for the development of methodologies for assessment of risks and hazards and impact assessment on the lives and health of the citizens and assets of the country, 2) historical databases for events that happened during the last 50 years 3) guidelines for the preparation of a unified risk and hazard assessment and a preliminary risk profile of the country. Unfortunately, only very few municipalities have actually prepared a risk assessment, besides those prepared through externally funded projects.

Pre-disaster baseline

The development and establishment of a pre-disaster baseline is essential in order to gauge the full extent of a disaster's impact. A baseline of the agriculture sector is not developed for the disasters occurred. As a result, this does not allow comparison of the changes between pre-disaster and post-disaster situations and conditions. The baseline data and information should be compiled before the post-disaster assessment is undertaken and should be validated as it serves as the basis for the estimation of damage and losses for the disaster-affected area(s). There are currently also no available tables to be used for the collection of the baseline data prescribed.

The sources of data that could be used for a pre-disaster baseline, which provide reliable and detailed information are the State Statistical Office and the Agricultural Market Information System. The State Statistical Office is a specialised and independent organisation within the state administration. The responsibilities of this institution are to collect, process and disseminate statistical demographic, social and economic data, although it does not gather any disaster related data.

Relevant agricultural data that is systematically collected, includes data on the production of field crops, orchards and vineyards, and livestock production as well as comparison data for several years. In addition, the publications on the structure and types of agricultural holdings, contains data on the individual agricultural holdings and business entities and their classification according to the type of farming and outputs.

Data on agricultural input and output are collected on a monthly basis and gathered from business entities, cooperatives and agricultural holdings. The data on prices is readily available and accessible, however it is not user-friendly as it is calculated in indices. Although, data can be provided by the Statistical office on demand as can be viewed at the following website <http://www.stat.gov.mk/>. Additional data on current and past prices of agricultural inputs and produce, which can be used for sourcing of data is the Agricultural Market Information System accessible at the following webpage <http://zpis.gov.mk/?lang=mk>.

Hazard analyses and databases

Previously data on flood and drought events were collected and flood maps were produced by HMS, such as data on the extensive floods of 1962 and 1979. However, due to the lack of human and financial resources and capacities there is no specific database that collects hazard data. The CMC is currently developing an official hazard database of natural and man-made events and disasters, which occurred in the past 50 years, although droughts are not included. The PRD has some

information about major flood events and provides risk assessment information to relevant government institutions for the planning of prevention measures against floods. It also received hazard information from its 35 regional offices, which aim to help determine whether hazard assessments and protection and rescue plans need to be undertaken. However, the collected data is not saved in an organized database. In addition, due to the lack of available and appropriate data processing software, there is limited utilization of available data and development of relevant products and services.

Hazard mapping

Flood and drought maps are currently not developed on a wider scale, besides some pilot work ongoing through projects. Although HMS produced some flood maps in the past, while both CMC and PRD are lacking the capacities to conduct hazard mapping. A GIS unit is present at the Department for Operations and Operations Logistics within CMS, but it has limited technical knowledge and expertise. HMS has some GIS capacities, but it does not have the proper software and required human resources to undertake GIS mapping. CMC does have a GIS platform established, which includes web applications and databases for the inventorization of critical infrastructure, exposure and vulnerability of population, registry of resources, national emergency management grid.

Post-Disaster Needs Assessment (PDNA)

The current methodologies employed are not in line with the Post-Disaster Needs Assessment (PDNA) approach, which includes damage and losses assessment, as they mainly lack verification, assessment of the human dimension impact or any consideration for disaster risk reduction, which seems to be evident also from the recurring character of the disaster, affecting largely the same population.

Methodologies used for collection, aggregation and evaluation of data

Post-disaster needs assessments conducted following the occurrence of disasters help to inform the government of the impact of the disaster. In the FYR of Macedonia, this the process at municipal level, where Local Standing Councils, composed of local stakeholders such as farmers, leaders, mayor, establish Commission. These Commissions are in theory supported by emergency specialists from the CMC, the relevant ministries and also include technical experts. The Commissions are responsible for collecting data and conducting post-disaster assessments of agricultural damage and losses in the affected sub-sectors, generally crop and livestock.

The Law on Agriculture and Rural Development defines damages and compensation of the farmers due to occurrence of climate disasters (Art 99 and art 99 b), which are then outlined in different legal acts providing. The damage and losses assessments consider the total agricultural land affected, the typology of crops and animals affected and the consequent loss of production in financial terms. The assessment is conducted according to Governmental decision number 23-4922/1 (2001), which prescribes the methodology. This methodology includes general explanations, but stops short of providing appropriate templates and indications for sourcing of reference data such as prices.

According to this Governmental decision the scope of work of every unit of the local self-government is the following:

- Form the required number of expert commissions for the evaluation of damages;
- Determine the specific area of work for every expert commissions for the evaluation of damages;
- Determine the deadline for completion of the evaluation;
- Ensure the application of the methodology for the evaluation of damages;
- Consolidate the work of all expert commissions for the evaluation of damages in the area of the local self-government and provide the necessary assistance;

- Prepare a cumulative report on the damage evaluations in the area of the local self-government and submit the report for adoption to the Council of the local self-government;
- Submit the adopted report to the national commissions for the evaluation of damages.

The tasks of the national commission are as follows:

- Consolidate the work of the damage evaluation commissions of the local self-governments in the country;
- Provide them with any assistance they may require to apply the methodology for the evaluation of damages;
- Prepare a cumulative report about the evaluated damage in the country;
- Submit the cumulative report about the evaluated damages in the country to the Macedonian government together with proposed measures that need to be undertaken to remove or mitigate the consequences of the damages.

Note that there are differences in terminology in the governmental decision compared to the above-mentioned text, originates from the fact that the decision number 23-4922/1 (2001) predates the existing system in place.

The final estimated cost of the damages and losses is sent to the National Council and eventually to the Ministry of Finance, which calculates the expected compensation. A clear methodology for the aggregation of the damages from all the affected municipalities is not available. There is currently an ad hoc support system in place, which allows farmers to report their damages and losses, however the government decides on an ad hoc basis whether it compensate them, which depends on the available budget.

On the basis of the scale and extent of the disaster, it can be declared as a crisis at regional or national level. When the event exceeds municipal boundaries, the so-called Regional Councils of the National Platform are established to cover several geographically close municipalities. These decisions are made by the Government Crisis Management Center – Joint HQ. During regional and national emergencies and crises, the Government decides on the additional institutions to be involved and proposes activities to be undertaken.

For instance, during the floods of 2015, the Government undertook a full Rapid Needs Assessment (RNA) based on the principles of the Post-Disaster Needs Assessment (PDNA) methodology with support from the World Bank. The Government charged the MAFWE to manage the data collection and to conduct the analysis of the sector. In addition, the State Court Valuator Bureau was given the responsibility to cross-check and validate the financial value of the damage and losses, as the assessments from the Municipal level contained inconsistencies, although standards seem to be non-existent.

Numerous inconsistencies were observed by MAFWE in the Local Commissions and Councils work, which stem among others from the lack of training, lack of capacity, inadequate and inappropriate interpretation and application of the regulations, lack appropriate and detailed methodology and most of all, lack of supervision and oversight by specialized state institutions. Given the often highly limited capacity of the Local Commissions, the assessments produced are often lacking certain aspects of the damages and losses and/or tend to be exaggerated. As the MAFWE is not included within the system, but rather through ad-hoc requests from the Government in terms of providing support or verify the work from the local commissions and councils. As a result, there seems to be no feedback mechanism in place to provide systematic comments from the Ministry back to these local commissions and councils.

Trigger for a post-disaster damage and losses assessment

National and regional damage and losses assessments are being initiated by the National Council on Emergencies. The initiation of the assessment at municipality level is initiated by the Municipal Council, without clear triggers for each disaster. The Council is called in session and decides to form a Commission for assessment on basis of real time reporting from the municipal officials and the residents.

Scope of the post-disaster damage and losses assessment

The governmental decision number 23-4922/1 (2001) prescribes the methodology and mentions the following about the scope of the assessment:

- “Subject of the evaluation shall be (1) the direct or immediate damages inflicted on the damaged or destroyed assets, the material and cultural treasures (hereinafter in the text assets and treasures), (2) the costs caused by the direct damages and (3) the indirect damages.
- The direct damages inflicted on assets and treasures of legal entities, sole proprietors and citizens shall be evaluated on: a) fixed assets (land, structures and buildings, equipment and plant, herd, forest and wild animals); b) turnover assets (raw materials and supplies, semi-finished products and unfinished products, ongoing agricultural production, finished products, commercial goods) and c) cultural treasures (structures, buildings and objects), household objects and treasures (passenger vehicles, furniture and other household objects).
- The costs of the direct damages include all expenditures for temporary defence, rescue and protection of the population, the livestock and other treasures during or in the immediate aftermath of the elemental and other disaster or any other reason that caused the direct damage.
- The indirect damages that shall be evaluated shall include the losses due to reduced production caused by elemental or other disasters for the area affected by direct damages”.

Differences in the scope are apparent when compared to the scope of a standard PDNA template which states the following:

- The damages are both quantified in terms of total number of partially and fully destroyed assets and infrastructure, and estimated in monetary value of damage, expressed as repair or replacement costs.
- The values are estimated on a basis of the original characteristics prevailing at the time of the disaster, or the prevailing market prices (for animals).
- The damage to fully destroyed physical assets is estimated by multiplying the number of destroyed units with the replacement cost or current market price.
- Damage to partially destroyed physical assets is estimated by multiplying the number of partially damaged units by their average unit cost of repair or rehabilitation.
- The value of the total damage from the disaster is estimated by aggregating the values of fully and partially destroyed assets.
- Standing crops inclusive those that were just planted, or in the vegetation period, are considered as losses and valued at value of the expected harvest. Annual and seasonal crops ready to be harvested are considered as harvested agricultural produce and are valued at farm gate price.

As a result, the main notable differences include:

- The definition of damages in the governmental decision number 23-4922/1 (2001) is very broad and partly covers the definition of losses in the PDNA methodology. The costs of repair are not foreseen to be included in the damages.
- The definition of costs in the governmental decision number 23-4922/1 (2001) includes recovery and reconstruction, which are not part of the calculation of damages in the PDNA, but rather part of the calculations of the recovery planning.

- The definition of indirect damages in the governmental decision number 23-4922/1 (2001) can be partly associated with the definition of losses in the PDNA methodology. However, it is limited to reduced production, while the PDNA methodology also covers the increased production costs on account of the disaster. There is no timeframe for the calculation of losses.

Validation of the post-disaster assessments findings

The principle of validating the data in order to ensure the integrity of the data collected and that there is no double-counting, is not performed as the Councils lack the technical capacity to verify the work of the Local Commissions. During the floods of 2015 and following to the noted inconsistencies the Government asked the State Court Valuator Bureau to validate the costing of the damages. However, a clear methodology for validation of the damages from the State Court Valuator Bureau is not available.

Assessment of the disaster impact

The macroeconomic impacts of the disaster on national and provincial levels are not estimated on basis of the disaster impacts. In addition, the impact of disasters on the socio-economic status and human development (such as impact on poverty, in particular rural poverty); on household and personal incomes and loss of employment; on debts and access to finance and on food security are not estimated or taken in account during the compensation.

Cross-cutting issues

The assessments performed or the follow up procedures do not indicate any cross-cutting issues to be addressed in the recovery process including: Gender and Social Equity and Disaster Risk Reduction (1. Resilient Livelihoods and Building Back Better, 2. Strengthening disaster risk reduction and management, 3. Technologies and practices that build resilient livelihoods, 4. Preparedness for response).

Recovery strategies and reconstruction needs

A specific recovery strategy is not produced for each disaster at the local, regional or national level. As such any support provided to the affected population is based on the available funds, which are distributed in accordance to ad hoc developed modalities. Follow-up recovery activities are mainly focused on restoration of major infrastructural damages mainly public infrastructure. In some cases, plans and budgets were allocated for the cleaning of river beds and drainage of canals, however the results from these activities are not easily evaluated, in particular given the recurrent nature of disasters in some areas. There is lack of vision and guiding principles for these activities, as they are planned on ad-hoc basis and not based on estimated reconstruction and recovery needs, priority needs, response analysis and formulation of interventions and financial costs.

Agricultural insurance

Agricultural insurance, as a risk transfer tool, can greatly help farmers access finance as they often do not have any collateral and thus are considered as a high-risk group. Agriculture is also a risky business due to the sector's high climate sensitivity. It is exposed to the adverse impacts of natural hazards, such as droughts, floods and frosts, which can lead to significant damages and even total production losses.

A significant part of the rural population is largely dependent on the sector for their food, lives and livelihoods in the FYR of Macedonia. These highly vulnerable communities also have a relatively low agricultural productivity and limited capacity to adjust to current and future climatic changes, which is due to e.g. the low quality of agricultural education, limited research and knowledge transfer, underdeveloped agricultural markets, lack of access to finance and the application of inappropriate

agricultural practices. These constraints are further challenged by climate change and the ability to manage risks through crop insurance will help to ensure and protect farmer's food security and income generation.

It is estimated that out of the 70 000 registered farmers, only 1 000 insured their crops, which represents less than 1.5 percent. Although other studies estimate this percentage to be not higher than 7 percent.¹⁶ Crop insurance has thus not yet been fully embraced by farmers and there are several reasons why this figure is fairly low. There is distrust between farmers and insurance companies as the farmers are not sure whether insurance companies have experts who are able to adequately assess the damages caused by natural hazards. In addition, farmers claim that the premiums are too high, although they understand that these prices will be lower if more farmers are insuring their crops.

There is limited awareness of the benefits provided by crop insurance and farmers expect that the damaged caused by natural hazards will be covered by the government. Since 2010, the government of the FYR of Macedonia has started to promote yield risk transfer via subsidizing up to 60 percent of the premium cost and this does not exceed MKD 200 000 per agricultural holding, which means that the farmers have to pay the remaining 40 percent of the premium costs, which they still consider to be high.¹⁷

There are two types of agricultural insurance, crop insurance and livestock insurance. In total, there are 15 insurance companies in the FYR of Macedonia, however only 4 companies offer these types of agricultural insurance. The leading company in this area is 'TRIGLAV', which has a market share of 63 percent. The market shares of the other 3 companies are 8 percent for 'ALBSIG', 1 percent for 'INSURANCE POLICY' and 28 percent for 'WINNER'.¹⁸ Table 5 provides an overview of the distribution in terms of number of contracts and gross policy premiums among these companies in 2012.

Table 5 Agricultural insurance in the FYR of Macedonia, 2012

	ALBSIG		INSURANCE POLICY		TRIGLAV		WINNER	
	No. of contracts	Gross policy premium (in MKD)	No. of contracts	Gross policy premium (in MKD)	No. of contracts	Gross policy premium (in MKD)	No. of contracts	Gross policy premium (in MKD)
Crop insurance	119 000	1 982 000	16 000	439 000	976 000	32 239 000	466 000	14 634 000
Livestock insurance	0	0	2 000	392 000	132 000	15 330 000	0	0

Source: Macedonian Information Center, 2013

At present, the Macedonian government provides subsidies for crop insurance, namely it covers wheat, barley, corn, grapes, tobacco, tomatoes, peppers, cucumbers, melons, apples and peaches, and provide compensation after damages have occurred due to hail, fire and storm. The government's budget for supporting this is often not sufficient to cover the damages caused by these natural hazards.

In terms of livestock insurance, the following animals can be insured e.g. cattle, pigs, sheep and goats, feathery animals, cats and dogs, fish. Covered risks are those related to death due to an accident or

¹⁶ Macedonian Information Center, 2013

¹⁷ Ibid.

¹⁸ Ibid.

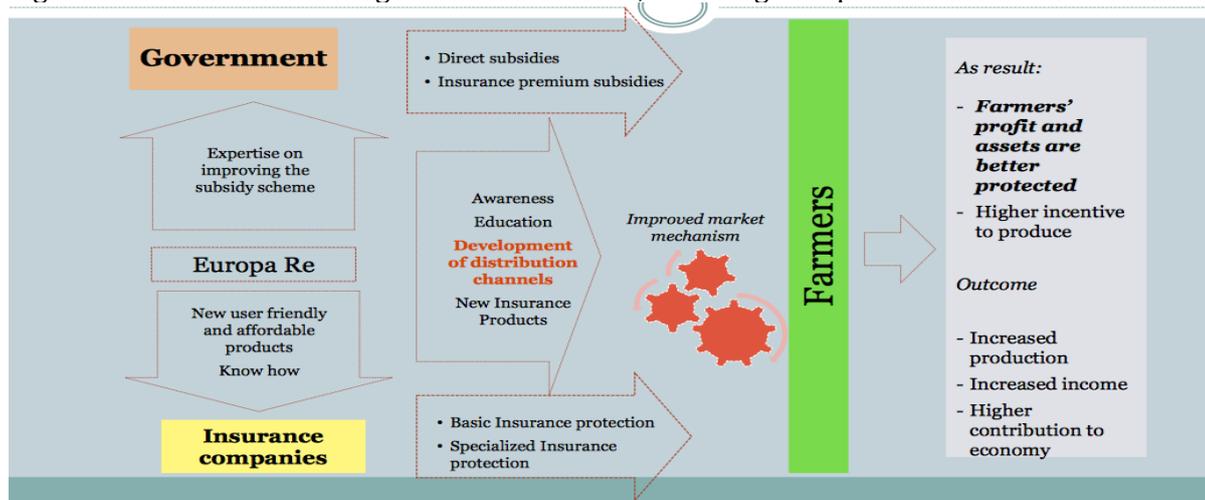
illness, emergency slaughter, health care expenses and emasculation. Drought is not covered by either livestock or crop insurance.

The government does not provide any subsidies for livestock insurance. It is unclear why livestock is not covered, although some findings indicate reasons, such as the huge budget requirements, the lack of experts to assess livestock damage and losses, the question whether the insurance is profitable and also if government should provide subsidies as part of its duty to ensure basic food production .

Another type of insurance product, beside crop and livestock insurance, was established in September 2014 in the FYR of Macedonia, namely the agriculture yield index insurance (AYII). This insurance product is aimed to protect farmers from the loss of crop yields as a result of adverse weather events and biological risks. AYII is established and supported by Europa Re, which is a reinsurance company that conducts reinsurance of agricultural insurance in the Balkan Region. Europa RE was established by South Eastern European countries with World Bank support. The FYR of Macedonia provide 5 million euros to this company.

AYII is a multiple-peril loss of crop yield policy, which insures against all climatic, naturally occurring and biological hazards. It provides coverage for systematic and covariate risks, including drought, frost, storms and floods. As a result, it helps to protect farmers against extreme weather events that impacts their yields. An overview of Europa RE situated within the FYR of Macedonia is shown in Figure 10 below.

Figure 10 Overview of agricultural insurance, including Europa RE in the FYR of Macedonia

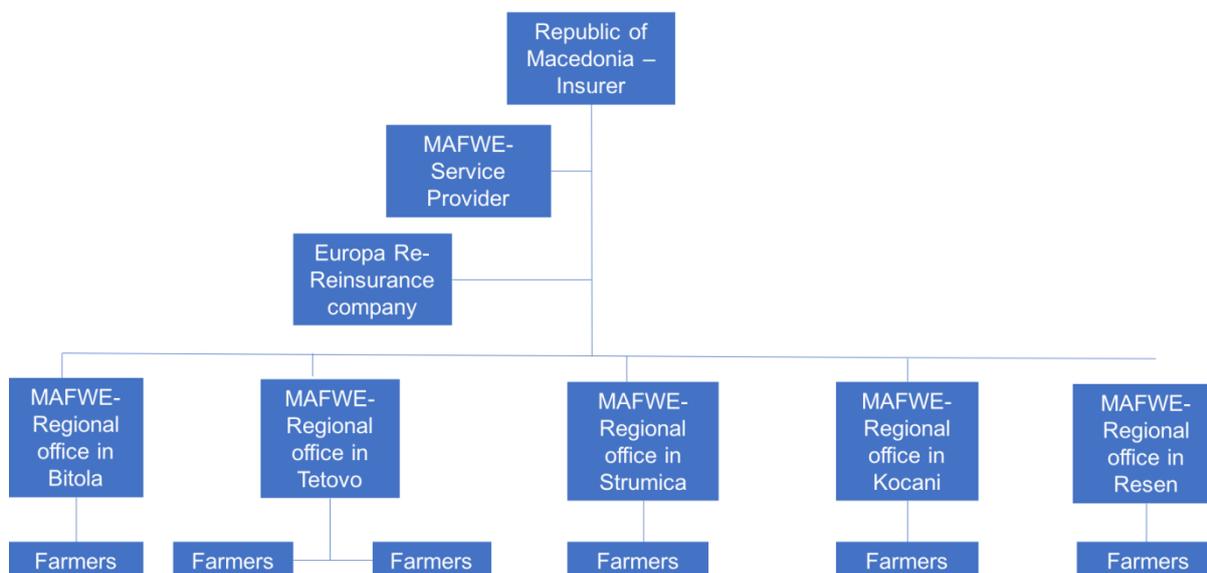


Source: Insurance Supervision Agency, 2015

In order to further improve the current situation, the Macedonian Information Center (2013), recommends the establishment of a new agricultural insurance scheme that is fully managed by the government. In particular, the Ministry of Agriculture, Forestry and Water Economy, which has national extension units located in 33 municipalities, which have access to the relevant data and information about the farmers and their crops.

If this scheme is managed by the state, it can participate in the reinsurance company 'Europa RE'. An overview of how the scheme could be structured in the country if it would be implemented is outlined in Figure 11.

Figure 11 Overview of proposed new agricultural insurance scheme in the FYR of Macedonia



Source: Macedonian Information Center, 2013

Through reinsurance, lower premium prices can be offered to farmers, which may increase usage of agricultural insurance by farmers. This will in turn lower their risks to natural hazards and increase greater access to finance for farmers. As crop insurance subsidies provided by the government ensure that insurance products cover larger risks at lower costs through the government’s participation in Europa Re. Farmers will also be encouraged to take crop insurance if they want to make use of state subsidies. As a result, the confidence in the scheme will be much higher as the state is legally responsible and chances that farmers will not being indemnified will be low.

Conclusions and recommendations

The Former Yugoslav Republic of Macedonia is prone to various natural hazards and has a Crisis Management System (CMS) in place to deal with these floods, earthquakes, fires and so on. The roles and responsibilities of the stakeholders at various levels involved in this system are mentioned in several disaster risk reduction and management (DRR/M) laws and national plans and strategies, including the 2004 Law on Protection and Rescue, the 2005 Law on Crisis Management as well as the 2008 National Security Strategy and the 2009 National Protection and Rescue Strategy. The agriculture sector or other sectors are not specifically mentioned, but indirectly a cross-sectoral approach is adopted.

A National DRR Strategy and Action Plan was established in 2014, but it has not yet been adopted. The expected increase in frequency and severity of natural hazards, in particular heat waves, droughts and floods, due to climate change is mentioned as well as the expected adverse impact that climate change will have on the agriculture sector, which will lead to direct and indirect agricultural losses. There is some mainstreaming of sectors, including agriculture, in this DRR strategy and action plan, although it is still quite limited.

In sectoral planning instruments, disaster risk reduction is not yet systematically mainstreamed. For instance, in the 2013 Law on Agriculture and Rural Development the terms 'disaster risk' or 'disaster risk reduction' are not mentioned, although adverse impacts caused by natural disasters on the agriculture sector are recognized. It also states the need to protect farmers' assets as well as support those who have incurred damages from natural disasters. Specific agriculture subsectors were not mentioned except for forestry, only within the context of the need to support sustainable forestry management.

The current National Strategy for Agriculture and Rural Development (NARDS) 2014-2020, in contrast to the previous Agriculture Strategy of 2007-2013, recognizes the increased risk of extreme weather events and climate change is considered as a threat to the sector. It also acknowledges its adverse impacts on agriculture subsectors, such as crop, livestock and forests. However, the strategy lacks systematic DRR mainstreaming, which as a specific structure is absent, in particular in assigning responsibilities to certain stakeholders. It also fails to set up a monitoring structure for DRR as a clear goal to be achieved or measured. DRR is thus not included as an objective or a strategic area with specific outputs and activities. Only general prevention and mitigation measures are mentioned, such as the need to enhance awareness on climate change and aim for sustainable resource management.

Other relevant planning documents, such as the National Development Plan 2007-2009 and the 2008 National Strategy for the Sustainable Development do not mention disaster risk reduction or natural hazards as such. It focuses on sustainable development with regard to natural resources management and environmental protection, such as the prevention and control of pollution, protecting and exploiting nature sustainably. No link is made between sustainable development within the context of climate change or any linkages between environmental and land degradation, including deforestation and the increasing vulnerability to natural hazards. In the National Development Plan, natural hazards and climate change are viewed as a threat, but inclusion of specific measures to reduce this threat are absent. With regard to the agriculture sector, only animal pests and diseases are mentioned within the context of potential transfer of these diseases to humans and the impact on human health.

The FYR of Macedonia has an institutional framework for disaster risk reduction and management. The Crisis Management Center (CMC) is the coordinator and leads the National Platform for DRR, which also include agriculture relevant stakeholders, such as the Ministry of Agriculture, Forestry and Water Economy (MAFWE) and the Ministry of Environment and Physical Planning. The roles and

responsibilities of these stakeholders are not very clear with regard to disaster risk reduction. A specific platform for agriculture, forestry and water management was established although insights on existing inter-institutional coordination and collaboration mechanisms and functioning seem to be absent or unclear.

Disaster risk assessments are prescribed in both the Law on Crisis Management and the Law on Protection and Rescue. Although disaster risk assessment methodologies differ as well as institutions assigned to undertake these assessments. In addition, technical knowledge and expertise seems limited. Through a UNDP project, guidelines for a unified risk assessment were established, although only a few municipalities have conducted these assessments due to lack of internal funding. With regard to undertaking multi-hazard and vulnerability mapping, establishing of databases with pre-disaster data, these activities can be enhanced and strengthened to help reduce the underlying vulnerabilities to natural hazards. Technical capacities seem to be limited or lacking with regard to developing (multi)-hazard map and using GIS software.

The FYR of Macedonia has a functioning early warning system in place, where relevant stakeholders for the agriculture sector are linked to the Hydro-meteorological Services. Various data, forecast products and warnings are collected and issued by HMS and disseminated to the relevant organisations. In turn, local units of the Ministry of Agriculture, Forestry and Water Economy, freely disseminates crop condition data to the HMS agrometeorological Division. Although it is not clear how this data is further used to enhance the application to the agriculture sector.

Collection of accurate and adequate data through a damage and losses assessment as well as a Post-Disaster Needs Assessment (PDNA) that is systematic and comprehensive for agriculture is essential for establishing encompassing disaster damage and losses databases in the FYR of Macedonia. At present, the methodologies for these assessments focus mainly on the crop and livestock subsectors and do not include forestry and fisheries. The assessment processes are currently ad-hoc and there seems to be a lack of methodologies to validate the data collected.

There are several insurance companies in the FYR of Macedonia that are offering agricultural insurance to farmers to help reduce the adverse impacts of natural hazards on agriculture. However drought is neither covered by crop or livestock insurance. Despite that the government are providing subsidies to pay 60 percent of the premium of crop insurance, farmers are still reluctant to purchase insurance. This is due to, among other issues, the lack of trust between farmers and insurance companies regarding their expertise to assess agriculture damage and losses, limited awareness of the insurance benefits and farmers viewing premiums as high.

The Macedonian government can enhance the participation of farmers in insurance schemes by participating in the reinsurance company 'Europa RE' and fully manage it. Through reinsurance, lower premium prices can be offered to farmers, which may increase usage of agricultural insurance by farmers. This will in turn lower their risks to natural hazards and increase greater access to finance for farmers. As crop insurance subsidies provided by the government ensure that insurance products cover larger risks at lower costs through government's participation in Europa Re. Farmers will also be encouraged to take crop insurance if they want to make use of state subsidies. As a result, the confidence in the scheme will be much higher as the state is legally responsible and chances that farmers will not being indemnified will be low.

Within the context of enhancing disaster risk reduction for the agriculture sector in the FYR of Macedonia, the following recommendations are suggested:

An enabling environment for legal, policy and institutional strengthening:

- Enhance the systematic mainstreaming of DRR into sectoral plans, policies and strategies, which requires the integration of DRR into objectives with specific outputs and prevention and mitigation measures;
- Strengthening the DRR/M institutional system and relevant agricultural stakeholders, defining roles and responsibilities and enhancing inter-institutional coordination and collaboration mechanisms to reduce adverse impacts of natural hazards on the agriculture sector. In this regard, a well-functioning national platform for DRR is very important as DRR is a cross-sectoral issue. However, at the moment, it seems to be present on paper only as the exact functioning of this mechanism is not clear.

Early warning system:

- Enhance the collection of meteorological and agrometeorological data, digitalized phenological database, development of forecast products and warnings, provision of updated meteorological thresholds through improving technical and human capacities for this data collection, consolidation and analysis, including the targeting of the agriculture sector;
- Develop a feedback mechanism where end users are able to provide inputs on whether the forecast and early warning products are addressing their needs, including the dissemination of warnings to farmers organisations or forums, which help to pass on the alerts to the local people and communities.

Reducing underlying vulnerabilities:

- Increase risk assessments for municipalities, also ensure to take into account agricultural risks;
- Prepare and establish flood and drought hazards maps, in particular multi-hazard maps;
- Enhance technical and human capacity to undertake GIS mapping;
- Enhance the systematic collection of hazard data for the official hazard database currently managed by CMC, thereby ensuring that this data is accurate and reliable;
- Ensure that data on drought events are also included in the official hazard database, which is being developed by CMC. This may also involve the acquiring of appropriate data processing software and training of people;
- Mainstream the flood data collected by the Protection and Rescue Directorate to be collected for the CMC database, so that hazard data are centralised.

Damage and losses assessment and PDNA:

- Collect and validate baseline data and information before post-disaster assessments are undertaken, which can serve as a basis for the more accurate estimation of damages and losses for the disaster-affected area(s) and establish tables that can be used for the collection of this baseline data;
- Ensure that assessments of damage and losses cover all agriculture subsectors and not only crop and livestock;
- Enhance the assessment methodology and include appropriate templates, in particular for the agriculture sector and indications for sourcing of reference data, such as prices, in line with the UNDG/EU/World Bank post-disaster needs methodology and standards;
- Systematise the assessment and reviewing of the report processes across all levels;
- Recommendations from the 2015 World Bank Rapid Needs Assessment, included increase awareness to establish a PDNA system and develop a national strategy to improve the PDNA methodology to systematically include the agriculture sector, see Annex 1.

Agricultural insurance

- Raise awareness among farmers on the benefits that crop and livestock insurance can provide in terms of transferring risk;

- Develop insurance products, which will help to reduce adverse impacts of drought. Drought, as a slow onset hazard, can have a significant impact on agriculture. Currently, crop and livestock insurance do not cover drought. Offering insurance products is also linked to the collection of accurate and reliable data on drought events and the impact on the agriculture sector. The existence of pre-disaster baseline data in organised databases is thereby also essential.

References

- Crisis Management Center.** 2012. *South East European Forum on Climate Change Adaptation*. Skopje. 21 pp. (also available at http://www.seeclimateforum.org/upload/document/petrovski_presentation.pdf).
- Crisis Management Center.** 2014. *National DRR Strategy and Action Plan. Draft*. Skopje. 19 pp.
- European Commission.** 2015. *The Former Yugoslav Republic of Macedonia – EU Recovery Programme for Floods*. Brussels. 11 pp. (also available at http://ec.europa.eu/enlargement/pdf/the_former_yugoslav_republic_of_macedonia/ipa/2016/ipa_2011_022988.11_floods_recovery_programme.pdf
- FAO.** ?. *Macedonian Agricultural Research and Extension System. Country Report*. Rome. 16 pp. (also available at http://www.fao.org/nr/res/wshops/docs/ws1_report_Macedonia_en.pdf).
- Insurance Supervision Agency.** 2015. *Agriculture insurance in Macedonia*. Munich, June 2015. 19 pp. (also available at http://www.internationalinsuranceforum.com/prop/wp-content/uploads/2014/10/22_Zoran-STOJANOVSKI.pdf).
- Macedonian Information Center.** 2013. *Development of an Agricultural Insurance Scheme*. Skopje. 29 pp. (also available at http://pdf.usaid.gov/pdf_docs/PA00J9PZ.pdf).
- Ministry of Environment and Physical Planning.** 2005. *The Law on Environment*. Skopje. 141 pp. (also available at <http://faolex.fao.org/docs/pdf/mac105107.pdf>).
- Ministry of Environment and Physical Planning.** 2008. *Second National Communication on Climate Change*. Skopje. 128 pp. (also available at http://www.adaptation-undp.org/sites/default/files/downloads/macedonias_snc.pdf).
- Republic of Macedonia.** 2002. *Law on Self Government*. Skopje. 27 pp. (also available at http://mls.gov.mk/images/laws/EN/Law_LSG.pdf).
- Republic of Macedonia.** 2006. *Strategy for Sustainable Development of Forestry in the Republic of Macedonia*. Skopje. 25 pp. (also available at http://www.fao.org/docs/up/easypol/580/4-2_strategy-macedonia_173en.pdf).
- Republic of Macedonia.** 2007. *National Agricultural and Rural Development Strategy (NARDS) 2007-2013*. Skopje. 132 pp. (also available at <http://faolex.fao.org/docs/pdf/mac147994.pdf>).
- Republic of Macedonia.** 2007. *National Development Plan 2007-2009*. Skopje. 163 pp. (also available at http://www.esiweb.org/pdf/macedonia_National_Development_Plan_2007-2009.pdf).
- Republic of Macedonia.** 2008. *National Strategy Development for the Republic of Macedonia Part I/II, 2008*. Skopje. 37 pp. (also available at <http://www.moep.gov.mk/wp-content/uploads/2014/12/NSSD-1-EN.pdf>).
- Republic of Macedonia.** 2013. *Law on Agriculture and Rural Development*. Skopje. 107 pp. (also available at http://mzsv.gov.mk/files/Zakon_za_zemjodelstvo_i_ruralen_razvoj_0.pdf).
- Republic of Macedonia.** 2014. *National Agricultural and Rural Development Strategy (NARDS) 2014-2020*. Skopje. 313 pp. (also available at <http://www.mzsv.gov.mk/NSZRR%202014-2020.pdf>)

The Former Yugoslav Republic of Macedonia. 2007. *Operational Programme Under the EU Instrument for Pre-Accession for Rural Development (IPARD). National Plan for Agriculture and Rural Development 2007-2013. Final Draft Version.* Skopje. 485 pp. (also available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/the_former_yugoslav_republic_of_macedonia/ipa/mk_comp_5_programme_25_02_2008_en.pdf).

WMO. 2012. *Strengthening Multi-Hazard Early Warning Systems and Risk Assessment in the Western Balkans and Turkey: Assessment of Capacities, Gaps and Needs.* Geneva. 310 pp. (also available at <https://www.wmo.int/pages/prog/drr/projects/SEE/documents/SEEPPhase%20I%20-%20FinalReport.pdf>)

World Bank. 2010. *Climate change and agriculture. Country Note for The Former Yugoslav Republic of Macedonia.* Washington, D.C. 16 pp. (also available at <https://openknowledge.worldbank.org/handle/10986/21836>)

World Bank. 2015. *Rapid Needs Assessment report.* Washington, D.C. 124 pp.

Annex 1 Needs and interventions proposed by the World Bank for enhancing Post-Disaster Needs Assessment and Disaster Risk Reduction and Management

Needs	Short term interventions		Mid term interventions		Long term interventions	
	Short term interventions	Short term interventions Budget (EUR)	Mid term interventions (12-24 months)	Mid term interventions (12-24 months) Budget (EUR)	Long term interventions (+24 months)	Long term interventions (+24 months) Budget (EUR)
<ul style="list-style-type: none"> • Post disaster needs Assessment System, • Mechanisms for protection of National budget 	Increasing awareness for needs for establishment PDNA System and scanning the current country situation related to the disaster management	50 000	Establishing PDNA system in line with PDNA Strategy	1 500 000	Further development of PDNA system	300 000
	Developing National Strategy for PDNA	100 000	Developing a mechanism for protection of the National budget	250 000	Provide capacity building to national and local institutions on PDNA	50 000
	Developing mechanisms for catastrophe risk insurance	150 000	Provide capacity building to national and local institutions on PDNA	50 000		
	Improved access to emergency funds and /or developing contingent loans	1 500 000				
	TOTAL	1 800 000			1 800 000	
Total interventions in Disaster Risk Management		3 950 000				

Source: World Bank, 2015

Questionnaire

Analysis of the disaster risk reduction/management system for agriculture in the FYR of Macedonia

Objective of the questionnaire

To obtain a comprehensive overview of the disaster risk reduction and management system in Macedonia, in particular for the agriculture sector. This will help to understand which activities, processes and actions currently exists, but also what is lacking, where the capacity gaps and needs are in order to strengthen the system so that adverse impacts from natural hazards on the agriculture sector can be mitigated. Feedback is collected in the areas of governance, early warning and information systems, vulnerability reduction, preparedness for response, response and relief, assessment of damage and losses and post-disaster needs as well as reconstruction and recovery.

The feedback received from this questionnaire as well as conducted desk research will serve as the basis for the session organised on 15 December 2016 from 14:00 to 17:00 as part of the international scientific conference "Contemporary Concepts of Crisis Management", to be held in Ohrid, the FYR of Macedonia, which will bring together relevant stakeholders to help to validate the findings as well as identify potential disaster risk reduction activities to be implemented in 2017.

Questionnaire filled in by:

Name:

Position:

Organization:

Please return this filled in questionnaire by 7 December 2016

	Questions	Remarks and comments, in particular, for the agriculture sector
1	Governance	
1a	Is the role and responsibilities of your organization mentioned in the DRR/M laws and policies? For example, in the Law on agriculture and rural development 2013, the 2004 Law on Crisis Management, 2005 Law on Protection and Rescue, 2009 National Protection and Rescue Strategy, the National Strategy for Agriculture and Rural Development (NARDS) 2014-2020? If yes, can you elaborate.	
1b	Are specific measures or areas of intervention for prevention and mitigation mentioned in the DRR/M laws and policies related to agriculture? For example, the use of early warning alerts and messages, vaccination of animals, use of drip irrigation (in context of drought). If yes, can you elaborate.	
1c	Are specific measures or areas of intervention for preparedness mentioned in the DRR/M laws and policies related to agriculture? For example, knowing where evacuation routes are also for livestock, ensuring sufficient water and feed for them in event of a disaster (feed stocks), storage facilities for seeds/food, livestock shelters, vaccine banks If yes, can you elaborate.	
1d	Is the role and responsibilities of your organization mentioned for prevention, mitigation and preparedness (DRR) in the related agricultural plans, policies and strategies? If yes, can you elaborate.	

1e	Are there sufficient human resources available for prevention, mitigation, preparedness (DRR)? Please elaborate, what are the positions of the staff who are working on prevention, mitigation and preparedness, such as flooding prevention, water control, livestock disease prevention?	
1f	Are the capacities of the available human resources sufficient to implemented prevention, mitigation, preparedness (DRR) activities?	
1g	Do staff have roles and responsibilities assigned with regard to prevention, mitigation and preparedness (DRR)?	
1h	Are specific staff with roles and responsibilities identified as DRR focal points or included in their job descriptions for agricultural related activities, such as e.g. land, forests, waters, pastures, crops, fisheries?	
1i	Are national inter-institutional coordination mechanisms established for prevention, mitigation, preparedness (DRR) at all levels?	
1j	Are regular meetings organised to gather all relevant stakeholders, such as in the National Platform for DRR? Is the Ministry of Agriculture/Ministry of Environment part of the National Platform for DRR? Do these Ministries have a specific DRR role and responsibilities? Are focal points within these Ministries nominated, what is their position within the organization? What is the current status of the 'Platform in the domain of agriculture, forestry and water'?	
1k	Which other relevant agricultural stakeholders have roles and responsibilities for the implementation of prevention, mitigation and preparedness (DRR) actions?	
1l	Is there a budget allocated for prevention, mitigation and preparedness (DRR)? If yes, can you elaborate.	
1m	Is there a specific budget allocated for prevention, mitigation and preparedness (DRR) for the agriculture sector specifically? If yes, can you elaborate.	
1n	What other funding mechanisms are in place to attract financial resources for DRR and in particular for the agriculture sector?	
2	National early warning systems	
2a	Is the national early warning system connected to international early warning systems, for instance does the HMS receive information and data from neighboring countries if flood is expected to be transboundary during to international river basins? If yes, for which natural hazards?	
2b	Is the early warning system connected to sectoral ministries, departments, Hydrometeorological Service and emergency centers and the lower levels of government (including communication and dissemination of risks from risk assessments)? If yes, can you elaborate how is it connected, for instance if HMS issues drought warning, are the relevant line ministries informed, what about local governments, including extension services?	
2c	Does the Ministry of Agriculture/Ministry of Environment or other sectoral organizations provide relevant agricultural risk information and data to CMC/HMS? If yes, what type of data, in which form or format and how often? If there a nominated focal point to the CMC and what is the position of this person?	
2d	Do you receive data, forecast products and warnings issued by HMS? For which natural hazards?	
2e	Are data, forecast products and warning accessible to organizations and people in real time? In which formats/through which media?	
2f	Are mechanisms in place to disseminate risk information rapidly to the public through mass media, local alert systems, with support from specialized agencies and information networks?	
2g	Do people and communities know what to do when they receive alerts and warnings? For which natural hazards? For example, if they receive	

	alerts for potential flooding in their area, do they know how to react and what to do?	
2h	Is there a way in which farmers could provide feedback to the hydro-meteorology services if the information that they received is useful for them?	
3	Vulnerability reduction - disaster mitigation and prevention	
3a	Do guidelines exist to outline how to conduct disaster risk assessments? Is the organization you are working for involved in this or only at municipal level or undertaken by other organizations?	
3b	Are disaster risk assessments methods and approaches agreed/standardized? Is there any quality check undertaken of these risk assessments undertaken by municipalities and/or are any other relevant institutions involved in the quality check of these assessments?	
3c	Are procedures for consolidation, classification and analysis of disaster risk information established, with criteria for levels of alert?	
3d	Are there reports of previous assessments available and/or have they been shared?	
3e	Have national multi-hazard risk and vulnerability maps been established? For which natural hazards/risks?	
3f	Are national disaster risk profiles for all sectors developed and disseminated to relevant stakeholders?	
3g	Are mechanisms and responsibilities for planning, monitoring and updating of disaster risk information and early warning defined?	
3h	Are land tenure laws and land use policies and other related instruments in place and enforced to reduce underlying vulnerabilities of risks to certain natural hazards, such as floods, landslides, forest fires etc.?	
3i	Are indicators defined for monitoring the implementation of the DRM plan and assessing the effectiveness of the different components?	
3j	Do prevention and mitigation practices and technologies at national level and applied/reinforced through sectoral line agencies? For example, the use of agricultural good practices such as drip irrigation, mulching for reducing soil erosion, increasing water efficiency, animal shelters to protect them from storms, intercropping/crop rotation, to reduce water run-off and soil erosion. If yes, can you elaborate.	
3k	Are there mechanisms or systems and processes in place for scaling up good practices and lessons learned?	
3l	Does knowledge and capacities exist within lead agencies about available prevention and mitigation practices and technologies or where to access them?	
4	Preparedness for response	
4a	Are resources and relief assistance/technical support that can be quickly mobilized (national, international, regional, NGO agencies) identified and listed with contact points and contact details?	
4b	Are rescue organizations established and equipped with infrastructure and equipment to save lives, livestock and property? Are logistical arrangements planned - transport, fuel, water, feed, etc.?	
4c	Are (animal) shelters, high grounds and facilities to protect lives and livelihood assets available (in collaboration with district/local level officials)?	
4d	Are basic stocks of relief materials (drinking water, foods, tents and blankets) permanently available in hazard-prone districts (centrally monitored & equipped)? Are there warehouses and emergency food storage facilities and are they regularly checked?	
4e	Are practice evacuation exercises regularly carried out and procedures agreed? Does it include agriculture related activities and sectors, like evacuation that takes into consideration of livestock?	

4f	Are emergency communication systems (directory with names and contact details of all actors which should be involved) at different levels in place to ensure rapid evaluation (pre- and post-disaster) and/or relief? What about for the agriculture sector?	
4g	Are contingency plans established for which natural hazards? What about the inclusion of specific vulnerabilities and risks and relevant measures / interventions for the agriculture sector?	
5	Response and relief	
5a	Does a declaration of emergency status exists as basis for calling for international/regional relief and technical assistance (UN, governments, INGOs) For all natural hazards?	
5b	Is a reliable alarm system in place to alert concerned officials to initiate emergency response and further evacuation as needed? Which of the agriculture related stakeholders are alerted? What is their involvement in the response and evacuation of ag e.g. livestock?	
5c	Are the organisations responsible for response and recovery activities connected to receive early warning alerts and information?	
5d	Are coordination committee/senior officials of the national coordination authority (CMC) and relevant sectoral ministries nominated to form an emergency committee when needed?	
5e	Is monitoring of relief/assistance operations conducted to ensure the aid reaches those in need and prevent diversion of aid to others?	
5f	Standards/criteria to decide length of emergency assistance exist?	
5g	Are adequate capacities and human resources in place to provide the needed logistical support?	
5h	Are adequate financial resources available or allocated to emergency response/relief? For which natural hazards?	
5i	What about with regard to being able to adequately support the agriculture sector with regard to response and relief?	
6	Assessing damage, losses and post-disaster needs	
6a	Are instruments, standards and processes for assessing damage and losses and post-disaster needs established and agreed? What about specifically for the agriculture sector and subsectors (crop, livestock, forestry, fisheries and aquaculture) and for which natural hazards? Are sectoral and cross-sectoral teams designated and trained? Are sufficient technical capacities and financial resources available?	
6b	Are standardized reporting formats for data collection and analysis methods in place?	
6c	Are standards and a validation methodology in place to check the accuracy of the assessments?	
6d	Is there a compensation system in place with identified criteria to identify which people are able to receive compensation for the damages and losses caused by natural hazards? What about with regard to farmers; what kind of compensation do they receive (100% monetary)?	
6e	Are there other ways available for affected farmers to get access to credit, loans or other financial means?	
7	Reconstruction and recovery	
7a	Are risk prevention and mitigation aspects ('building back better') included in reconstruction and recovery projects/plans? What about in particular for agriculture?	
7b	Arrangements for repair/reconstruction of infrastructure (e.g. roads, bridges wells, schools and other key buildings and services (e.g. health, education, agricultural extension and provision of inputs) and	

	defined responsibilities of relevant stakeholders in place? Are adequate and sufficient technical capacities current in place?	
7c	Do guidelines exist for 'building back better' of infrastructure works? What about specifically for the agriculture sector, with regard to e.g. irrigation systems, animal shelters, food storage facilities/warehouses?	
7d	Do national funding mechanisms or a national fund exist to promote reconstruction and rehabilitation?	
7e	Are risk assessment undertaken in both pre- and post-disaster reconstruction and recovery planning?	
7f	Is a mechanism in place to prepare plans for rehabilitation and economic recovery exist?	
7g	To what extent is your organization involved in reconstruction and recovery activities? What about specifically with regard to the agriculture sector? What kind of activities/measures?	
7h	Evidence of provision of key production inputs needed for livelihood recovery e.g. fishing boats and equipment, farming implements, seeds and fertilizers?	
7i	Are prevention, mitigation and preparedness elements incorporated into livelihood restoration/development programmes to build resilience to future hazards? What about specifically for the agriculture sector?	

<p>Session: Analysis of the DRR/M system for agriculture in the FYR of Macedonia</p> <p>Date: 15 December 2016</p> <p>Time: 15:30 – 19:30</p> <p>Participants: Representatives from e.g. Crisis Management Center, Protection and Rescue Directorate, Ministry of Agriculture, Ministry of Environment, Hydrometeorology Services, Agency for Food and Veterinary, PE Macedonian Forests.</p> <p>Objective: To discuss and prioritize actions to address current gaps and needs in order to strengthen and enhance Disaster Risk Reduction (DRR) capacities for agriculture in the FYR of Macedonia</p> <p>Structure: Approximately 60 minutes of discussions in three main groups followed by 30 mins of sharing of findings with questions and answers.</p>

**Group 1
Governance and institutional strengthening**

Challenges and constraints:

- The finalization of the 2014 national DRR strategy, which has still not been adopted;
- The lack of cross-sectoral cooperation in general as well as specifically among the agricultural subsectors, such as crops, livestock, fisheries and forestry as well as relevant sectors like water and energy;
- Insufficient number of Standard Operating Procedures (SOPs), which predominantly refer to communication, cooperation, command to cover all sectors, and i) the existence of blank spots; ii) SOPs that are not implemented in particular the lack of specific ones that cover certain hazards;
- Not recognized and not implemented long-term sustainable planning;
- Lack of financial budget support of DRR, which results in limited and insufficient implementation by all relevant institutions;
- Lack of adequate implementation of risk and hazard assessments and mapping and the use of an integrated approach. There is a lack of a baseline;
- Limited harmonization of legal/operational framework for DRR, which provides a basis for multi-sectoral approach and thereby involving all relevant institutions. There is a need for enhanced institutional cooperation;
- The current DRR system is still a reactive emergency approach and not a proactive DRR approach that focuses on prevention, mitigation and preparedness.

Ranking of importance 1 to 3 (1-high, 2-medium and 3-low)	DRR actions	Which institutions should be involved?	What is required or needed?	How can FAO provide support?
1	Adoption of the national strategy	Inter-sectoral working group, coordination by CMC/PRD	Political support, financial resources, knowledge, decision-making, awareness	FAO to support project activities, knowledge, experience, mediation, know-how, in particular for all sub-sectors – crops, livestock, fisheries and forestry

2	Development of a sectoral strategy for DRR – action plan; inclusiveness of stakeholders to be able to lead to decisions and working in a transparent, coordinated and responsible manner	Working groups to be established and cooperation among these working groups should be enhanced	Strengthening of institutional framework and cooperation of all institutions; there should be different layers of decisions, short and long-term with assigned priorities and timelines with adequate budgets and financial support to develop a sustainable action plan; multi-sectoral cooperation;	Support agriculture – crops, livestock, fisheries, forestry subsectors, know-how, best practices
1	Review of existing SOPs and the identification of new SOPs	All relevant and responsible institutions to be committed, e.g. including Ministry of Agriculture, Ministry of Environment, Crisis Management Center, Protection and Rescue Directorate, Hydromet, Agency for Food and Veterinary, PE Macedonian Forests	Multi-sectoral cooperation; decision-making and operational activities, action plan, support of all aspects, human resources	Support cooperation, funds, decision-making, support, awareness raising
1	Planning – realistic, evidence based, operationally with plans adopted	All relevant sectoral stakeholders, including e.g. Ministry of Agriculture, Ministry of Environment, Crisis Management Center, Protection and Rescue Directorate, Hydromet, Agency for Food and Veterinary, PE Macedonian Forests	Integration of plans, avoid overlapping/duration	Support to operation, expertise, methodology adopted
1	Improved financial allocation realistic funding	Ministry of Finance, Government, competent institutions	Raising DRR awareness, DRR sensitization	Support to operation, expertise, methodology adopted

**Group 1
Disaster risk assessments**

Challenges and constraints:

- Lack of an integrated risk assessment, which includes all risk elements (exposure, vulnerability, hazard, resources) as well as existing capacities;
- Lack of cross-sectoral cooperation;
- Limited risk mapping and maps by municipalities nor procedures or regulations in place and not clear in terms of who is responsible for this, also with regard to updating of the existing flood map;
- Lack of an integrated databases and Geographical Information Systems (GIS) platform;
- Inefficient damage assessment procedures, lack of damage and losses indicators, old methodology. In addition, all forms are currently hand-written and not available in digital form.

Ranking of importance 1 to 3	DRR actions	Which institutions should be involved?	What is required or needed?	How can FAO provide support?
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(1-high, 2-medium and 3-low)				
1	Unified / integrated risk and hazard assessments, in sectoral plans; establishment of a “guide/manual” for integrated risk and hazard assessments?	All relevant sectoral stakeholders	Review, updated, inter-sectoral cooperation, mapping of risks, supported with IT tools	Funds, knowledge, expertise
1	Integrated databases, timely updating, with contemporary technology for risk and improving information in the sectoral plans	All relevant sectoral stakeholders	Review, update	Funds, knowledge, expertise
1	Review of damage and loss assessment, including e.g. methodology, process etc. as well as propose measures for “digitalization: use of ICT for damage and loss assessment hazards	All relevant sectoral stakeholders	Review, update	Project, expertise

**Group 2
Early warning systems**

Challenges and constraints:

- The current state of the meteorology network of stations is insufficient and requires to be updated with additional automatization. In addition, there is a lack of experts and financial resources to maintain and manage this network as well as there is an issue with the procurement procedures, e.g. if not planned well, the procedure can be time consuming or only the lowest offer can be accepted;
- There is a need for MeteoRadar, which is an online meteorology radar system that provides real-time data, which is regularly updated;
- A database, which is automated, is also required, which includes data as there is a lack of critical information as well as a lack of experts to main this database;
- Drought monitoring – There is a need to determine critical points and thresholds for declaring different types of drought, including agricultural drought, meteorological, hydrological drought etc. In addition, there is a need to determine critical points and thresholds for enhancing information and action in the agriculture sector. The monitoring of soil moisture is needed as well as the use of satellite data in line with EU policies;
- Flood protection operational plan is required for mapping, e.g. use of GIS is needed for all relevant natural hazards, including heat waves, cold waves, drought, floods, excessive rain for the agriculture sector. The lack of existence of a plan in the event of floods, erosion and implementation of measures and activities to enhance early warning and information systems for reducing impacts of natural hazards.
- Lack of financial funds and plans, in events of floods, there is a need for initiating various projects to implementation several activities to enhance early warning and information systems for reducing impacts of natural hazards

Ranking of importance 1 to 3 (1-high, 2-medium and 3-low)	DRR actions	Which institutions should be involved?	What is required or needed?	How can FAO provide support?
	Maintenance and modernization of meteorology network	HMS	EWS, GIS	Donation/AWS/vehicle

	Climate operational system, including the creation of soft- and hardware	HMS, Ministry of Agriculture, CMC, FAO	Tools/R-software, GIS	Training for R- and GIS
	Drought monitoring, including the creation of a drought map for future analysis	HMS, Ministry of Agriculture, CMC, FAO	Drought assessments, vulnerability (tools, methods), institutional cooperation and collaboration	Training/drought indices, satellite monitoring and data/ soil moisture and vegetation index/
	Flood protection, including erosion, riverbeds regulation	Department of Water Management Municipalities, HMS,	Training/donations/institutional cooperation	Donations, training.
	Erosion reduction map	Ministry of Agriculture, CMC, Municipalities, HMS	Demographic vulnerability map	Project
	River bed regulation	CMC, PRD, Ministry of Agriculture	Financial plan	River bed cleaning machines

Group 2
Preparedness for response

Challenges and constraints:

- There is a need for more comprehensive planning regarding preparedness for response in the agriculture sectors, especially at municipality level. As there are no plans or maps created by municipalities. In addition, there are limited human resources and expertise regarding this. There is also a need of a better preparedness and operational plan. Among others there is a need to upgrade and update the flood plan for the FYR of Macedonia, including for example identification of evacuation routes for livestock and so on;
- There is a need for preparedness for response exercises specifically for the agriculture sector and trainings to strengthen capacities and knowledge as well as lack of financial resources, funds and equipment such as seed reserves, food storage facilities, vaccinations

Ranking of importance 1 to 3	DRR actions	Which institutions should be involved?	What is required or needed?	How can FAO provide support?
	Enhanced planning and assessment for improving preparedness for response in agriculture	Ministry of Agriculture; Municipalities; Ministry of local-self government; Hydro-meteorological Agency; Public and private entities; Universities	Material resources; HR; Comprehensive planning; trainings and exercises in agriculture	Capacity building and trainings to enhance preparedness in agriculture, such as preparedness exercises; Funding

Group 3
Agricultural good practices and technologies for hazard reduction

Challenges and constraints:

- Inadequate transfer of knowledge and technologies, including information regarding cost-benefit analysis;
- Confusing jurisdictions/competencies and authorizations/powers between Ministry of Agriculture and Ministry of Environment regarding water management;
- Obsolete techniques and technologies, such as old irrigation systems as they have been over 20 years old and some have been damaged;
- Soil degradation is a large issue. Climate change and urban development are additional challenges. The population in the rural areas is aging;
- Inadequate varieties (e.g. resistant to drought);
- Development of animal husbandry/livestock production;
- Timely execution of agro-technical measures;
- Prevention of diseases and pests;
- Insufficient application of organic fertilizers;
- Tradition versus innovation;
- Sentimental market approach strategy (ex Yu area)

Ranking of importance 1 to 3	DRR actions	Which institutions should be involved?	What is required or needed?	How can FAO provide support?
1	Strengthening the capacity of advisors/extension services and better cooperation of science and research (ToT, projects that focus on collaboration of scientists-researchers, advisors and farmers)	Ministry of Agriculture	Political will	Support and lobbying
2	Reduction of soil degradation	Competent state institutions and research institutes	Securing funds	Technical support and training
3	Reducing overlapping jurisdiction with regard to water management	State institutions, including Ministry of Agriculture and Ministry of Environment	Establishment of working group for resolving issues regarding overlapping areas of work	
	Reconstruction and supply of equipment, including agricultural facilities and irrigation equipment & techniques and a set of good practices and technologies for DRR in agriculture	Competent state institutions and research institutes	Securing funds	
	Research and development strategy oriented approach for good practices and technologies for DRR in agriculture	Ministry of agriculture	Establish Research & Development section within the Ministry of agriculture	Lobbying
	Establish a monitoring body for identification, selection and validation of good practices and technologies for disaster risk reduction in agriculture	FAO	Find the experts and combine them into a team	Establish a FAO office in FYR of Macedonia

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