Chapter 7
Building Capacities for Agricultural Disaster Risk Reduction in the Western Balkan Countries: The Case of Female Farmers in Serbia

Tamara van 't Wout, Anna Maria Augustyn, and Dragan Terzic

Introduction

The Western Balkan region is exposed to various natural hazards such as floods, landslides, storms, droughts, forest fires and earthquakes. With the changing climate, the occurrence and intensity of these hazards are increasing significantly. The adverse impacts on agricultural production and food security are clearly visible through extensive damages to agricultural equipment and facilities and production losses to the crop, livestock, forestry, fisheries and aquaculture subsectors. At the same time, the severity of these impacts is, among others, linked to environmental issues, e.g. the rapid dynamics in land use, land consolidation and abandonment, which are undermining diverse and healthy ecosystems that are in turn less climate resilient. Enhancing the policy and institutional capacities to adequately manage disaster risks is thus crucial to effectively address these challenges.

It is anticipated that the frequency and severity of hydrometeorological and climatological hazards, like floods, droughts, storms and changing seasonal patterns due to climate change, will present major challenges. The climatic changes that have already occurred have adversely impacted agricultural livelihood systems and related food security and nutrition (FAO 2015b). Moreover, drivers like population growth, rising incomes and urbanization will increase the demand for food and expect to lead to changes in lifestyles and consumption patterns, such as an anticipated decrease in grains and other staple crops, while vegetables, fruits, meat, dairy

T. van 't Wout (✉)
Food and Agriculture Organization of the United Nations, Rome, Italy
e-mail: tamara.vantwout@gmail.com

A. M. Augustyn
International Consultant, Warsaw, Poland

D. Terzic
Agrolink, Kruševac, Serbia

V. R. Squires, M. K. Gaur (eds.), *Food Security and Land Use Change under Conditions of Climatic Variability*, https://doi.org/10.1007/978-3-030-36762-6_7

and fish will increase. At the same time, natural resources, including land, water, energy and biodiversity, are limited and in certain areas already degraded, which may further undermine the sustainability of food and agricultural production systems as well as constrain poverty alleviation and sustainable development in the coming decades (FAO 2009; Emadi 2019).

Smallholder farmers, herders, foresters and fishers, especially those in developing countries, are among the most vulnerable to natural hazards and climate change, as agriculture is among the most climate-sensitive sector (Squires, Gaur and Feng this volume). These people and their communities are often highly dependent on the sector and its activities for their food and nutrition security, income, livelihoods as well as overall well-being. It is estimated that the livelihoods of approximately 2.5 billion small-scale producers rely on the sector and related activities (FAO 2013). They manage over 80 percent of the world's estimated 500 million small farms and provide over four-fifth of the food consumed in developing countries (IFAD and UNEP 2013). In addition, they are also the custodians of these resources due to their role in food production as well as the management of natural resources.

An increase in frequency and severity of natural hazards is expected to magnify in the years to come (IPCC 2012). This means that floods and droughts will occur more often and affect more harshly rural populations. In order to manage their adverse impacts and improve preparedness, several concerted efforts have been thus undertaken by a range of international and national bodies. Most notable in this context, the Sendai Framework for Disaster Risk Reduction 2015–2030, provides for an intergovernmental agreement, with an aim to reduce disaster risk including economic, physical, social, cultural and environmental assets that belong to humans, their businesses, communities and countries (UNISDR 2015). Moreover, in certain geographic regions, such as the Western Balkan countries, additional provisions come with the preparations for the EU accession, i.e. introducing the acquis communautaire via enforcement of the EU Floods Directive (2007/60/EC) and related directives concerning environmental matters, e.g. the assessment of the effects of certain public and private projects on the environment (Environmental Impact Assessment – EIA Directive 2011/92/EU) and the assessment of the effects of certain plans and programmes on the environment (Strategic Environmental Assessment – SEA Directive 2001/42/EC) (European Parliament and the Council of the European Union 2001, 2007, 2011).

These legal documents and agreements promote improvements of the setting in which management of disaster risk is taking place. They are followed by the financial investments, stakeholder dialogues and a wide range of projects. They also require strengthening capacities of actors involved in their implementation at all administrative levels. In result, it is expected that a greater resilience could be achieved, i.e. the improvement of the system's ability, community or society exposed to hazards to 'resist, absorb, accommodate to and recover from the effects of hazard in a timely and efficient manner, including the preservation and restoration of its essential basic structures and functions' (UNISDR 2009: 24; Alexander 2013).

Objectives

The purpose of this study is to describe the overall context in which capacity building efforts for DRR are undertaken in the Western Balkan countries' agriculture, with special reference to Serbia. Our main rationale was to observe the changes that have occurred in the approaches to DRR in the recent years, with a special focus on the efforts for building capacities of the local communities. Our hypothesis was that the current efforts are still insufficiently targeted to the needs of the farmers, and their capacities to absorb the growing body of the DRR tools and management practices, notably those related with the emergence of the information and communications technologies (ICTs) and geospatial data, platforms and applications.

Methodology

In this study, we take a closer look at the various mechanisms which have been fostered in the Western Balkan countries with regard to improving their capacities in managing the disaster risk in the rural areas and the agricultural domain. While to date, most studies have been concerned with the capacity building of the administrative personnel and relevant governing bodies or NGOs, our study has a unique focus on the capacities or rural population and farmers in particular. The study included desk research combined with primary data from a questionnaire that was administered to female farmers and their communities in the rural areas of central and southern Serbia.

The study was conducted in the Fall of 2017 and reached out to 30 respondents who participated in the survey. It was conducted with the community of farmers who participated in the FAO regional disaster risk reduction (DRR) project implemented in 2016–2017. The initiative aimed at enhancing the resilience of farming communities to natural hazards, in particular floods, landslides and drought in the Western Balkan countries. The questionnaire was developed and administered among 30 female farmers in Serbia. The objective of this survey was to identify the impacts of different types of natural hazards on agriculture as well as gaps and needs for capacity building of female farmers to help to better plan and implement risk reduction measures in the agriculture sector.

Our survey was targeted to female farmers aged 30–67, all of whom were married, except one who was separated. The number of household members varied from 2 to 9, with an average of 4.2, of which only 11 and 9 of the 30 female farmers had girls and boys up to 18 years, respectively, with an average of 1.27 girls and 1.11 boys. In total, 7 participants (23%) indicated that they had completed primary school and 20 (67%) secondary school. Female farmers who participated in the survey were from the cities in the central and southern parts of Serbia, namely, Kruševac (villages: Bela Voda, Srnje, Vratarare, Jasika, Lazarica), Svrljig (Grbavče, Radmirovac, Izvor, Prekonoga, Lalinac and Svrljig) and Kraljevo (Ratina).

Some of the challenges in obtaining the data were related to, e.g. being able to interview the female farmers due to their busy schedules as well as gender-related issues, such as the decision-making power of the head of the household. Among some of the limitations and constraints included the limited number of respondents, which result in the findings providing only an insight into some of the issues, challenges and constraints with regard to capacity building, and access to and use of information and data to help reduce the adverse impact of natural hazards, such as droughts and floods, on agriculture in the central and southern part of Serbia. In this regard, the results can be seen as a case study with general observations. It is not valid for the entire region or country.

Disaster Risk Reduction

Disaster risk reduction is defined as ‘preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development’ (UNISDR 2017). Following the devastating impact of the Indian Ocean tsunami in December 2004, the Second World Conference on Disaster Risk Reduction was held in Kobe in January 2005, which resulted in the establishment of the Hyogo Framework for Action (HFA) (2005–2015). The HFA aimed to reduce disaster risk and in particular build the resilience of nations and communities to disasters.

Its successor, the Sendai Framework for Disaster Risk Reduction (SFDRR) (2015–2030), was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR). It aims to achieve ‘the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries’ (UNISDR 2015: 12).

The Sendai Framework has seven targets and four priorities for action aimed at preventing new as well as reducing existing disaster risks. Among the four priorities of action are (i) understanding disaster risk, (ii) strengthening disaster risk governance, (iii) investing in disaster risk reduction for resilience and (iv) enhancing disaster preparedness for effective response and to ‘Build Back Better’ in recovery, rehabilitation and reconstruction. The Framework establishes linkages with climate change with regard to, e.g. the exacerbation of disasters as well as one of the underlying disaster risk drivers.

The SFDRR fosters collaboration of the actors involved in managing disaster risks at all levels, with a special attention paid to strengthening capacities of the local communities and reducing their vulnerability. Coupled with growing concerns around the climate change and its increasing impacts on natural disasters, in this context, it is worth to highlight the community-based initiatives (CBIs) as a popular way to manage the responses at the local level (Allen 2006; Rojas Blanco 2006; Forino et al. 2018).

Disaster Risk Reduction in the Agriculture Sector

Agriculture is a highly climate-sensitive sector, and climate change will add another challenge to ensure sufficient agricultural production, due to the expected increase in the frequency and severity of extreme weather events, like floods, droughts and storms, which may lead to further damages and losses to crops, livestock, forestry, fisheries and aquaculture. Also, due to drivers such as population growth, rise in incomes and changing consumption and lifestyle patterns, there will be an increase in the demand for food, e.g. meat, dairy, fish, vegetables and fruits. At the same time, natural resources, including land, water, energy and biodiversity, are limited and in certain areas already degraded, which may further undermine the sustainability of food and agricultural production systems as well as constrain poverty alleviation and sustainable development in the coming decades (FAO 2009; Squires et al. this volume).

Reducing disaster risks and adapting to climate change for agriculture may include the application of on-farm practices. Technologies like conservation agriculture, agroforestry, using water more efficiently through drip irrigation systems and rainwater harvesting (FAO 2013). The use of local and hazard-resilient crop, livestock, fish and forestry varieties, such as drought-resistant or flood-tolerant varieties and breeds, as well as ensuring genetic diversity to enhance the efficiency, adaptability and resilience of production systems (Anya and Ayuk 2011; FAO, 2015a) can be beneficial. Moreover, it may also include reducing risks to natural and managed ecosystems (e.g. deforestation, ecosystem-based adaptation, biodiversity management, sustainable aquaculture, application of local and indigenous knowledge), risks of sea level rise (e.g. coastal defence structures, including dams and dikes but also mangroves, sustainable land use and planning).

Besides, it also includes interventions related to information systems to help to better understand disaster risks (e.g. disaster risk assessments, the use of climate and extreme weather information for farming decisions agriculture post-disaster damage and loss databases to help assess DRR investments and interventions) and early warning systems as well as shock-responsive risk transfer mechanisms (i.e. social protection and insurance schemes) and enabling legal, policy and institutional environment to support government planning, implementation, monitoring and evaluation of interventions as part of building resilience to climate variability and change.

For the agriculture sector, disaster risk reduction (DRR) and climate change adaptation (CCA) are closely linked as farmers and agricultural communities have for generations adapted on the basis of climate variability. There are many similarities between DRR and CCA as both aim to reduce risks and vulnerabilities from climate change and climate-related hazards. Although CCA focuses on hydrometeorological and climatological hazards as well as changes to the average conditions, DRR also focuses on all natural hazards, e.g. geophysical hazards. As a result, the area that is overlapping is sometimes indicated as ‘climate risk management’ as shown in Fig. 7.1.

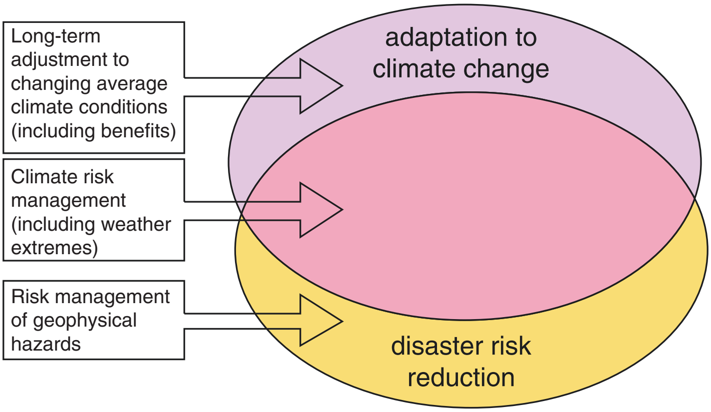


Fig. 7.1 Overlap between CCA and DRR (Source: Mitchell and Van Aalst 2008)

The importance of these linkages as well as the need for integration between DRR and CCA was also highlighted in the 2005 Hyogo Framework for Action as 'the integration of risk reduction associated with existing climate variability and future climate change' (UNISDR 2005: 11). Moreover, in the current Sendai Framework for Disaster Risk Reduction 2015–2030, it is stated that 'to incorporate DRR measures into multilateral and bilateral development assistance programmes within and across sectors, as appropriate, related to poverty reduction, sustainable development, natural resource management, the environment, urban development and adaptation to climate change' (UNISDR 2015: 25). In addition, the support for risk reduction actions, such as 'early warning systems, emergency preparedness, comprehensive risk assessment and management, risk insurance facilities, climate risk pooling and other insurance solutions' was included in the 2015 Paris Agreement (United Nations 2015: 4) as well as in the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. Various targets within the various Goals, e.g. Goal 1 on No Poverty, Goal 2 on Zero Hunger, Goal 11 on Sustainable Cities and Communities and Goal 13 on Climate Action, include targets related to DRR, CCA and building resilience to climate variability and change.

As a result, some of the risk reduction measures available to help agricultural producers reduce risks of climate-related hazards can also be used for adapting to climate change and as such are not different for the agriculture sector. Signs of convergence between DRR and CCA have been observed in, e.g. the agriculture and water and sanitation sectors (Tearfund 2008; Mitchell et al. 2010; CDKN 2014). In this regard, building resilience to climate-related hazards is a basis for both DRR and CCA, with DRR focusing on enhancing existing capacity in order to anticipate, resist, cope with and recover from the impact of hazards, while CCA is more concerned with future risks, thus trying to, i.e. address uncertainty/new risks (Tearfund 2008).

Capacity Building

The concept of capacity building has been central to practice of many donors, organizations and institutions involved in the disaster risk reduction and management (DRRM). While there is a lack of single definition, it is commonly narrated through the associated principles, processes and outcomes such as ‘participation’, ‘empowerment’ or ‘helping people to help themselves’ and strengthening civil society organizations (Eade 1997). Building upon these conceptual frames, the efforts of development agencies are thus oriented on strengthening the actors that are the end-users of development interventions or have to deal with those directly.

In the recent decades, one of the main reasons behind the growing focus on capacity building as a solution to existing challenges such as disasters is the tendency to delegate the power from the central to local level (multilevel governance) and the subsidiarity principle (Berger and Neuhaus 1977; Stephenson 2013). Moreover, it has been the core imperative for transformation of the governing structures and a precondition of the EU accession in the aspiring countries (Bache 1998; Bailey and de Propris 2004). In line with this, the complex EU acquis[1] needs to be translated into the settings of interconnected institutions and actors that deliver the services in a synergetic way.

Frequently, cascade approaches are promoted, where capacity building is offered to the intermediary bodies which deliver further capacity building to other ones. In addition, people-centredness, women empowerment, sustainability and resilience are referred to in this context. An increased participation of citizens in governance is expected to improve as a result of capacity building efforts (Cairns et al. 2005; Cuthill and Fien 2005). Communication between the actors and learning processes is also at the centre of those approaches. They build upon various streams of knowledge, especially those from psychology and education (Lewin 1946; Freire 1970; Pluskota 2014). Action research and learning are the goals and ways triggering the positive transformational process towards (Fals-Borda 1984; Thompson and Scoones 1994; Ison and Russell 2000; McCall and Peters-Guarin 2012; Kagawa and Selby 2012).

In the context of agriculture, DRRM involves a wide range of tools and methods. Specific attention is paid to building capacities of farmers and agricultural extension services, which are in the frontline of communication with farmers and risk-prone communities and experiential (or learning-by-doing) approaches (Altieri 2004; Van der Wal et al. 2014). One of the most popular practices in the developing context is the farmer field schools (FFS), through which the disaster risk reduction good practices and technologies for agriculture can be demonstrated, validated and upscaled. This approach was developed by FAO and partners nearly 25 years ago in Southeast Asia as an alternative to the prevailing top-down extension method (Feder et al. 2003; Van den Berg 2004; Tripp et al. 2005).

[1] **Acquis** is a French term **meaning** ‘that which has been agreed’.

In a typical FFS, a group of 20–25 farmers meet once a week in a local field setting and under the guidance of a trained facilitator. They use control plots where the conventional practices are implemented as well as test plots to compare the differences in terms of, e.g. yields, income generation, ability to reduce the adverse impacts of natural hazards, and ability to reduce/remove greenhouse gas emissions. They experiment with and observe key elements of the agroecosystem, exchange knowledge and information, discuss and plan.

The learning-by-doing approach promotes farm-based experimentation, group organization and decision-making as farmers are able to see for themselves if the practice works, which creates ownership that can lead to farmers replicating and upscaling the practices in their own plots or convincing other farmers to do the same. This is also encouraged through the organization of field day to show local politicians, government agricultural workers and other farmers what they are doing. Exchange visits with other FFS are also encouraged, and the season-long approach helps build stronger social ties, also between farmers, extension workers and researchers, that carry on after the initial FFS. Ideally, the same practices should be tested and validated through, at least three seasons, to ensure that these are effective. FFS can be a powerful methodology to facilitate change and adoption of different practices and technologies. At the same time, it often leads to positive improvements in the farming systems, such as increasing farm productivity (Godtland et al. 2004).

Gender Inequality and Capacity Building

Women play a significant role in the agriculture sector. Approximately 43% of the global agricultural labour force in developing countries are estimated to be female (FAO, 2011a). Even though women's contribution to the sector varies across and within countries, in general, the labour burden of rural women exceeds that of men, including a larger share of unpaid household tasks with regard to preparation of food and collection of water and fuel (Elham 2019).

Women and men are affected by the same risks differently, but they also face different types of risks, as a result of various factors, related to, e.g. economic vulnerabilities (i.e. differences in wages), culturally specific gendered norms (i.e. different household tasks), mobility constraints and language barriers. The economic and social gender-specific vulnerabilities are often interlinked and may lead to chronic poverty and higher vulnerability levels, especially to external shocks and stresses, such as extreme weather events and climatic changes.

In many developing countries, women still own fewer assets (i.e. land, livestock) than men as well as have limited access to inputs, such as seeds, fertilizer, labour and finance as well as access to information, knowledge and capacity building trainings. Some of the various challenges and constraints related to this include often higher illiteracy rates among women than men as well as limited access to information that is disseminated using information and communications technologies

(ICTs) as they are less likely to own a mobile phone or have access to a radio as well as general lack of Internet facilities and access to Internet. This may also limit women's ability to access early warnings as well as (i.e. seasonal, monthly) climate forecasts for agriculture. Women may be involved in other household-related responsibilities and tasks when climate information is transmitted. It is highly important that women have access to these early warning alerts and climate forecasts, as they have, particularly in developing countries, a substantial role in agricultural production as well as family nutrition (World Bank n.d.; McOmber et al. 2013; Oedoemelan 2016; IFLA 2017).

In this regard, also ensuring that women have access to agriculture-specific knowledge and trainings on, e.g. resilient and sustainable agricultural practices and technologies, is highly important, as in general they have very limited access to extension services compared to men. It is estimated that globally women only receive 5% of agricultural extension services (UNDP 2016). Extension services as well as the promoted practices and technologies should also address women's needs. Farmer field schools (FFS) in Kenya, Uganda and Tanzania, where women farmers participated, also focused on vegetable gardens and seed nurseries, postharvest management and storages as well as integrated nutrition and health with agriculture. As a result, women were able to obtain valuable knowledge for contributing to the household's and communities' food and nutrition security (ODI 2009; FAO, 2011b).

Serbia's Natural Hazards and Climate Change in Agriculture

Serbia is highly prone to natural hazards. According to the INFORM Risk Index of 2018,[2] the country is exposed to natural hazards, such as (flash and river) floods, storms, drought, landslides and earthquakes, and biological hazards, like plant and animal pests and diseases, which may lead to substantial damages and losses to animals and people. As shown in Fig. 7.2, Serbia is among the most exposed and vulnerable, although Bosnia and Herzegovina is ranked the highest among the Western Balkan countries with regard to natural hazards and humanitarian crises and disasters.

In Serbia, floods have occurred the most frequently during the 1990–2014 period, followed by extreme temperatures and earthquakes as shown in Fig. 7.3. The valleys with the larger water courses and where settlements, farmland, infrastructure and industry are located are more prone to inundation, in particular in the Vojvodina region as well as along the rivers of the Sava, Drina, Velika Morava, Juzna Morava and Zapadna Morava. These floods in the major river basins are usually the result of

[2] This index measures the risk of humanitarian crises and disasters through 50 different indicators for hazards and exposure, vulnerability and lack of coping capacity, among others. The index consists of data and country profiles for 191 countries and is free and publicly available. For more information, see http://www.inform-index.org/Countries/Country-Profile-Map.

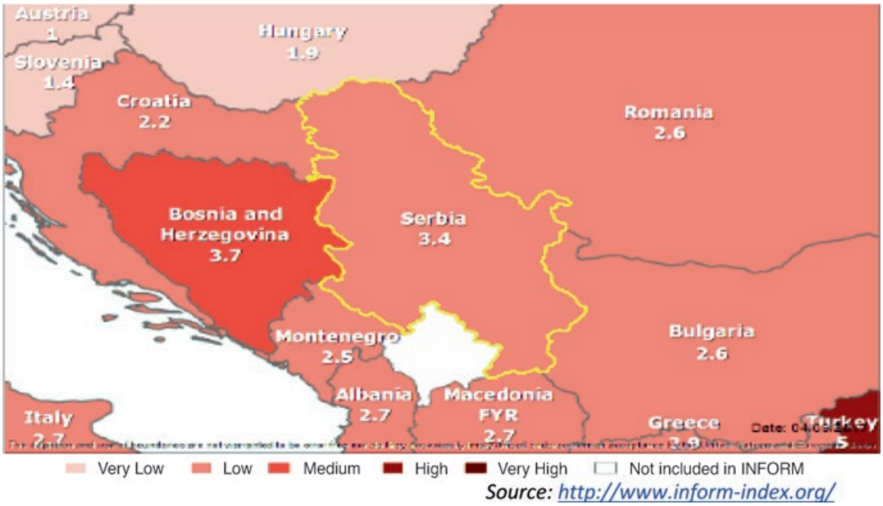


Fig. 7.2 INFORM Risk Index of 2018 for the Western Balkan region. (Source: http://www.inform-index.org/)

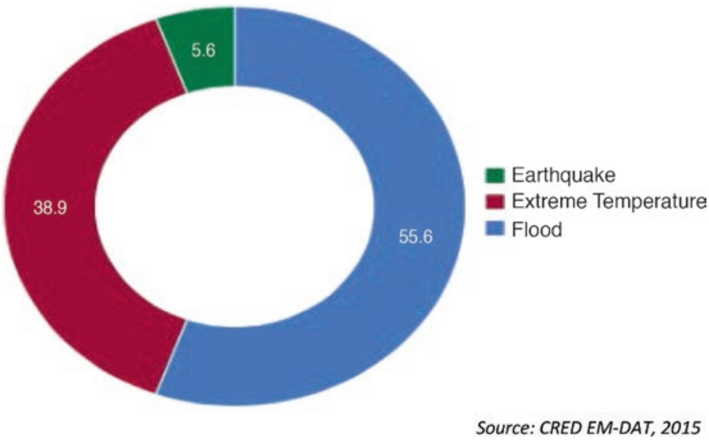


Fig. 7.3 Frequency in percentage by type of natural hazard in Serbia, 1990–2014. (Source: CRED EM-DAT 2015)

longer periods of extensive rainfall and/or the intensive melting of snow, while flash floods in the smaller river basins and generally due to short intensive rainfall as a result of summer storms. Moreover, factors, like the lack or limited maintenance of embankments and/or flood defences as well as debris and sediments blocking river, drainage or diversion channels, contribute to the extent of inundation.

Past disasters have substantially impacted the agriculture sector, for instance, the severe rainfall that occurred during the months of April and May 2014, which resulted in the worst flooding in over a century and affected 24 municipalities. The total damages and losses to all sectors were estimated at EUR 1.5 billion, of which 15% or EUR 228 million was the impact to the agriculture sector. It was calculated that EUR 107.9 million and EUR 120.1 million were estimated damages and losses, respectively, to the sector. In terms of recovery and reconstruction needs to the sector, these were estimated at EUR 152.1 million, of which EUR 40.8 million for recovery and EUR 111.4 million for reconstruction (UN/EU/World Bank Group 2014).

The impacts of droughts on the sector is also significant. Especially the areas in the eastern part of the country as well as in the Pannonian Basin in the north are drought-prone. During the 1991–2010, 1992, 1993, 1998, 2000, 2003 and 2007 were years that were extremely dry (WMO/UNCCD/FAO and UNW-DPC 2013). While 2 years later in 2009 and particularly between April and September, Sremska Mitrovica towards the north-west as well as Central Serbia was affected by drought (Duričin and Bodroža 2013). Again, during the Summer of 2012, a drought negatively affected the sector with estimated losses to agricultural production of approximately USD 2 billion, e.g. corn (USD 1 billion), sugar (USD 130 million), soybeans (USD 117 million), fruits and vegetables (USD 100 million), sunflowers (USD 55 million) and other agricultural crops (USDA Foreign Agricultural Service 2012).

Climate change projections estimate the increase in frequency and intensity of natural hazards, such as floods and droughts, as well as in terms of scope and duration (IPCC 2012). In addition, it is anticipated that there will be increased exposure to multiple and compound climate-related risks between 1.5 °C and 2 °C of global warming, and these risks are likely to impact, e.g. food security, livelihoods, water supply, health, human security and economic growth (IPCC 2018).

In Serbia, during the 1960–2012 period, a rise in the daily mean temperature has been observed, as well as in the daily minimum and maximum temperatures with an estimated average rise of 0.3 °C annually and per decade. In addition, eight out of ten hottest years ever were reported after 2000. In general, an increase in precipitation has also been observed, although with different distribution intensities during the year. This included an increased number of heavy rainfall events, although the total annual precipitation was relatively small (Ministry of Environmental Protection 2017).

It is anticipated that climate change will result in a rise in temperature by 0.5–0.9 °C and 1.8–2.0 °C, respectively, under A1B scenario for 2011–2040 and 2041–2070. While under the A2 scenario, the expected temperature will increase by 0.3–0.7 °C in 2011–2040 and 1.6–2.0 °C in 2041–2070. Towards the end of the century (2071–2100), the predicted rise is 3.2–3.6 °C under the A1B scenario and 3.6–4.0 °C under the A2 scenario. In terms of precipitation, under the A1b scenario, the anticipated changes vary from +5% to -20% and from +20% to -20% under the A2 scenario. The decrease in rainfall is especially predicted during the summer months. Frost days are expected to become rare towards the end of 2100, together with longer periods of droughts predicted to last for over a month under both scenarios (Ministry of Environmental Protection 2017).

It is expected that agricultural production of various crops will be impacted by climate change due to changes in temperature and precipitation. For instance, during the 2001–2030 period, maize is predicted to mature 7–13 days earlier, although for soybean and wheat, no change is expected. However, during the 2071–2100 period, both maize and soybean are anticipated to flower more than 2 weeks earlier, while full maize and soybean maturation may happen up to 2 months and 2 weeks earlier, respectively, which can substantially impact quantity as well as quality of yield. As a result, for some crops, yield reductions are estimated, such as -10% for winter wheat in the southern area of Serbia expected for the 2071–2100 period and soybean yield changes from -14% to 20% for the 2071–2100 period in the northern and southeastern areas of the country (Ministry of Environmental Protection 2017).

Serbia's Agriculture Profile

The agriculture sector is an important sector for the economy of Serbia, as it accounts for approximately 8.2% of its gross domestic product (GDP) (World Bank data 2009[3]). In certain regions of the country, the sector is a core economic activity for people's livelihoods. In general, the areas in the south and southeast are the poorest, whereas the Vojvodina region in the north is more endowed in terms of fertile soil and where the large agricultural commercial companies and cooperatives are located with sizes varying from 50 to 2500 hectares (FAO 2009[4]). In general, the country has favourable climatic conditions as well as extensive water resources for its agricultural production. In addition, over half of the country's surface is agricultural land (4,867,000 hectares), of which 71% (3,437,000 hectares) is utilized agricultural land (Ministry of Agriculture and Environmental Protection 2014). Among its primary export products include. maize, wheat, apples and frozen raspberries. It is estimated that these products make up around 21% of its national exports (USDA 2015[5]).

It is estimated that 40% of its total population reside in rural areas, where one in every five persons is over 65 years, while in the southern and eastern parts of the country, it is calculated to be one in every four. Around one-third of the female population in the rural areas did not attend any school or unfinished or finished primary school (Ministry of Agriculture and Environmental Protection 2014). While it is estimated that approximately two-thirds of these people fully or partially rely on the agriculture sector and its activities for their livelihoods, according to official statistics, about 20% of the working population is employed in the sector (Republic of Serbia 2014). The country's unemployment rate is estimated at 12.8% in 2018, while its youth unemployment rate is calculated at 29.7% in 2018 (Eurostat 2019).

[3] World Bank data, 2015.

[4] FAO data, 2009.

[5] USDA, 2015.

Findings from the Survey

While the survey respondents were 30 female farmers, a relatively small group, it was challenging to perceive them as a homogenous group. On the contrary, they were very diverse in terms of land ownership, sources of incomes, employment, agricultural production and participation of their farms in the market.

With regard to land ownership, 20% totally owned the land, 10% owned more than half the land, 10% owned less than half the land, while the majority (53%) did not own the land. Of those female farmers who indicated that they owned the land, 47% indicated that their husbands actually owned the land and 27% indicated that they themselves owned it. With regard to average size of the land, it was calculated at approximately 1.8 hectares.

The majority of the female farmers were an unpaid family worker (57%), an employee (37%) or an employer (3%). For the majority of the participants (53%), farming was not the main source of income, although for 43% it was. Moreover, for 90% of the participants, who were engaged in food production for consumption, and at the same time, 67% are also engaged in food production for the market, but 30% said they were not.

In terms of agricultural production, 47% of the survey participants were engaged in vegetable production, including tomato, cucumber, paprika, etc., while 10% was engaged in crop production, like maize and winter wheat production and livestock production, such as poultry and pigs, while 50% were engaged in a combination of two or three. For instance, two participants combined both vegetable and crop production, while one participant combined vegetable and livestock production and another one combined vegetable, crop and livestock production (Fig. 7.4).

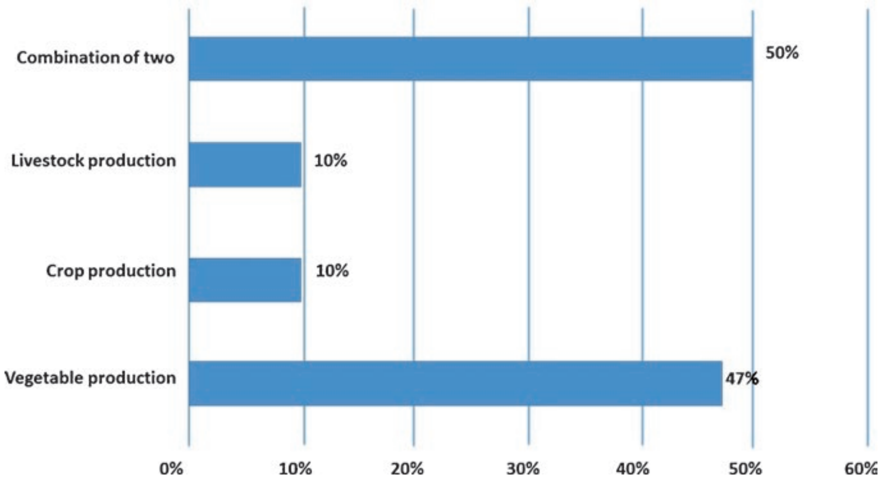


Fig. 7.4 Engagement of female farmers involved in the type of agricultural production in Serbia (%). (Source: Agrolink 2017)

All female farmers who participated in the survey were engaged in various agricultural activities, and the extent varied per type of activity. For instance, most of them were involved in seeding (70%), manual removal of weeds (60%), processing and storage (47%), and animal management (43%) as well as to a lesser extent involved in preparation of land and harvesting (23%) and transportation (10%) (Fig. 7.5).

Survey respondents were asked about the extent to which various natural hazards could cause damage to their agricultural production. As shown in Fig. 7.6, the impact of drought is considered high and very high in terms of resulting in damage and losses to agriculture. While flood, storm winds and excessive precipitation may damage some but not all farmers' crops and livestock. For most participants, landslides are viewed as for the most part not adversely impacting the sector.

Despite that natural hazards can cause significant damage and losses to crops, livestock, forestry, fisheries and aquaculture, there are also many other factors that may constrain the development of the farm. For instance, the participants viewed, among the limiting factors, the lack of working capital, the lack of labour among the most important factors as well as, to a lesser extent, natural hazards, lack of market, low profit in production and poor soil quality. While the lack of knowledge and inability to make and implement decisions were seen as less limiting, opinions were divided with regard to lack of land and lack of machines and equipment as shown in Fig. 7.7.

When the surveyed female farmers have a problem related to agricultural production, they turn the most to other trusted producers, as well as to some extent read relevant books/magazines, use the Internet or consult with extension service officers, but not many turn to research for support (Fig. 7.8). With regard to the method of information that they use the most, similar answers are provided, but also including watching relevant TV shows as a source of information (Fig. 7.9).

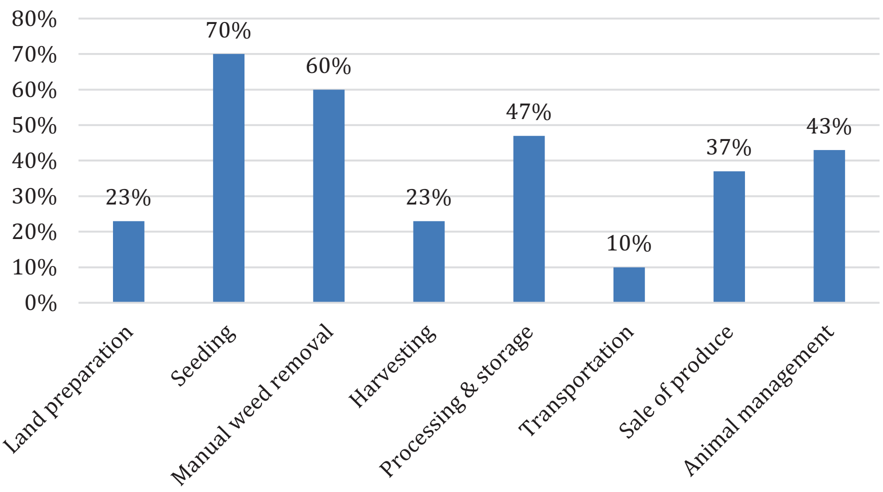


Fig. 7.5 Engagement of female farmers in the type of agricultural activities in Serbia (%). (Source: Agrolink 2017)

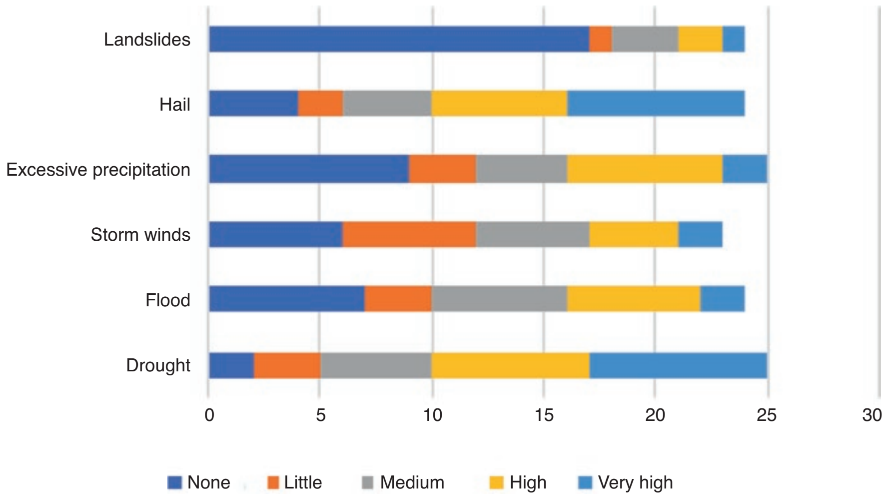


Fig. 7.6 Overview of the types of natural hazards that can cause damage to agricultural production in Serbia (number of respondents). (Source: Agrolink 2017)

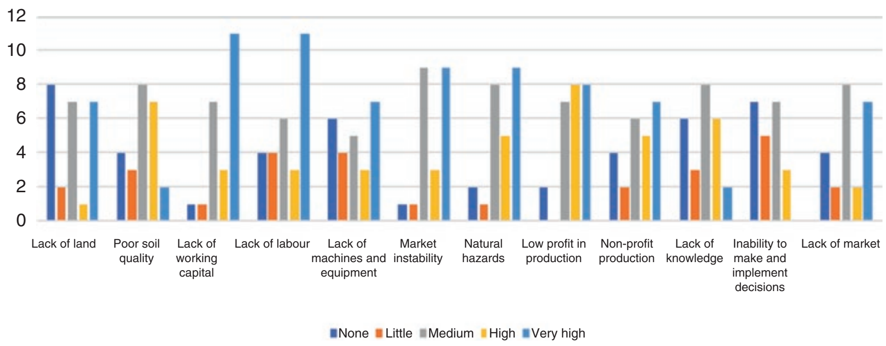


Fig. 7.7 Overview of the limiting factors constraining development of the farm in Serbia (number of respondents). (Source: Agrolink 2017)

A survey question was also included on the various obstacles that female farmers face when launching new agricultural production in order to better understand their challenges and risks. Establishing a new type of agricultural production can also help to diversify existing production, thereby mitigating the risk of total or partial production failure due to, e.g. extreme weather events, like floods, droughts and storms. Among the obstacles considered include the lack of subsidies and favourable loans as well as lack of workforce, the fear of failure, lack of knowing what is profitable as well as insufficient professional knowledge and skills for new production. However, insufficient professional institutional support and distance and poor traffic connections with other cities are not extensively viewed as obstacles (Fig. 7.10).

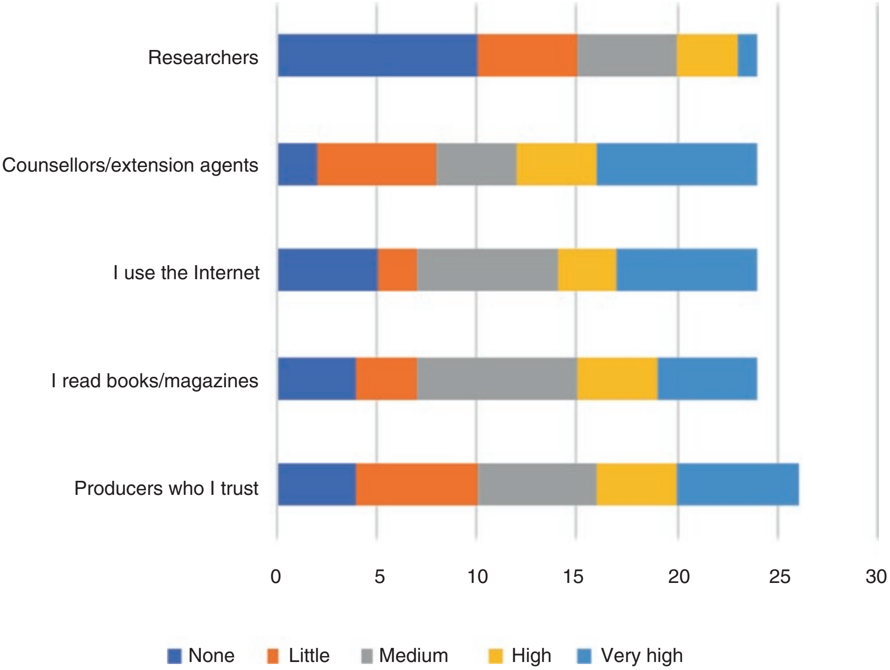


Fig. 7.8 Who do you turn to for help most when?

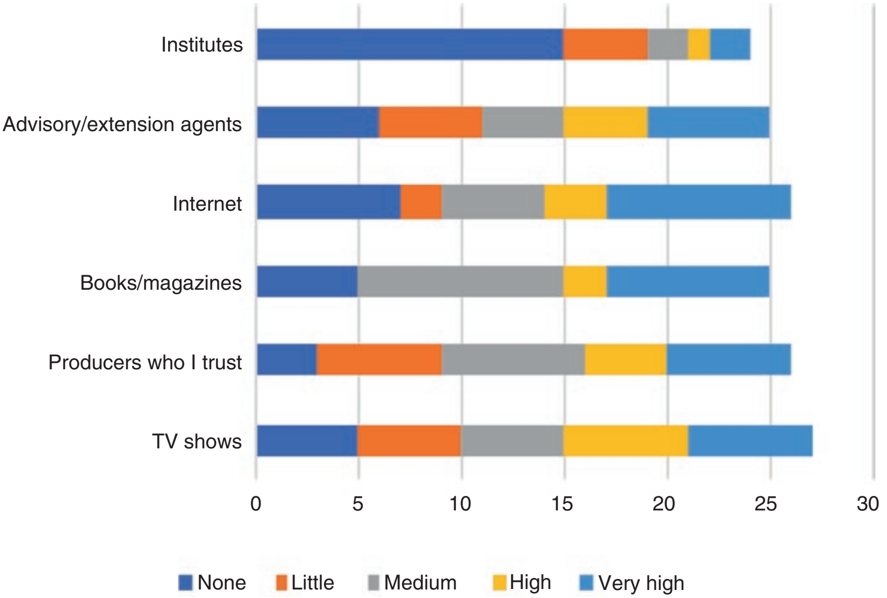


Fig. 7.9 What method of information do you use most, you have a production related issue (number (number of respondents)? respondents)? (Source: Agrolink 2017)

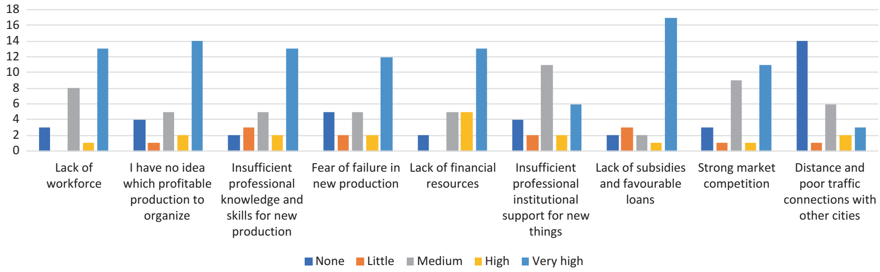


Fig. 7.10 Possible obstacles to launching of new agricultural production in Serbia. (Source: Agrolink 2017)

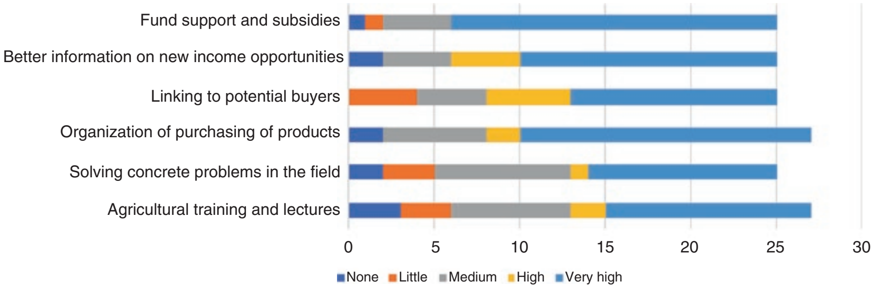


Fig. 7.11 What kind of support would to help overcome these obstacles? (Source: Agrolink 2017)

Since the access to financial resources was indicated as one of the primary obstacles, fund support and subsidies is therefore considered as a way to address this constraint as well as some market-related issues, such as better information on new income opportunities, linking to potential buyers and organizing the purchase of products. Capacity building-related support is also viewed as important, including agricultural training and lectures, as well as support to help solve concrete problems in the field as outlined in Fig. 7.11.

In terms of challenges that the participants face when attending trainings, workshops or meetings, 27% said that they lack time as a result of farm/employment obligations, followed by 23% who are not informed about these capacity building events, while 7% indicated that they did not attend and some did not have the opportunity to go to the training, and some specifically said that this was due to the lack of permission from their husband (Fig. 7.12).

Most of the survey participants (43%) indicated that they never received any information or advice from extension service on agricultural production, while 23% and 27% said that they do receive frequently and a few times, respectively, and 7% said they only once received information or advice. In addition, 16% said that usually other family members deal with extension, 13% said that no one contacted them and 3% indicated that they do not see how these advisory services could be useful to them (Fig. 7.13).

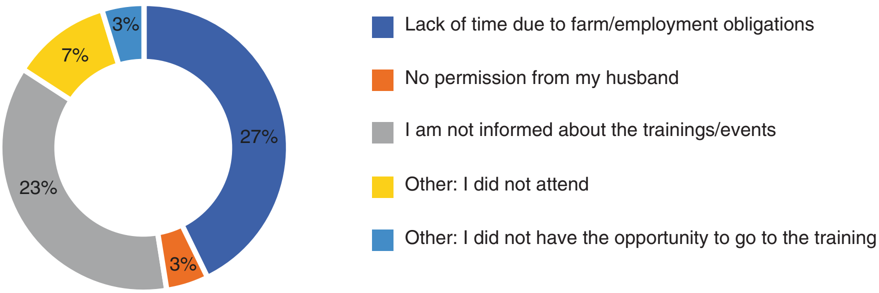
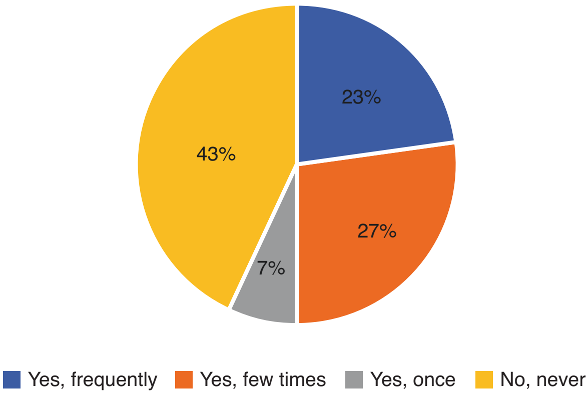


Fig. 7.12 What challenges did you face when attending trainings, workshops or meetings in Serbia (%)? (Source: Agrolink 2017)

Fig. 7.13 Have you ever received any information or advice from extension service on agricultural production in Serbia (%)? (Source: Agrolink 2017)



Conclusions

Serbia is prone to various types of natural hazards, e.g. floods, landslides, droughts, storms and wildfires. With climate change, these natural hazards are expected to increase in frequency and severity. Agriculture is one of the most climate-sensitive sectors and is anticipated to be adversely impacted, through damage and losses to crops, livestock, forestry, fisheries and aquaculture, by climate-related hazards. The sector and its related activities are an important source of food and income for the majority of people, in particular those who reside in rural areas. Within the context of climate change, mitigating the negative effects of extreme weather events on agriculture is essential.

Female farmers form a substantial part of the agricultural workforce in Serbia, especially with regard to small-scale vegetable production in their gardens. In the presented case study, women are involved in various agricultural activities, e.g. seeding, manual weed removal, animal management, processing and storage and to some extent selling of produce, land preparation, harvesting and transportation. Female farmers are particularly vulnerable to adverse impacts of natural hazards (especially drought, but also floods, storm winds and excessive precipitation) on their agriculture-related activities. Even though natural hazards can lead to significant damage and losses to crops, livestock, forestry, fisheries and aquaculture, other factors also constrain the development of their farms, including issues related to lack of or limited financial resources, lack of labor, lack of markets and poor soil quality.

From the case study findings, it has become apparent that for access to information, knowledge and capacity building activities, the majority of the female farmers surveyed would turn to other trusted producers and less to reading relevant books/magazines. Use of the Internet or consulting with extension service officers, while not many turn to research for support. Among the obstacles encountered when establishing new agricultural production were more related to lack of or limited financial resources, lack of labour and fear of failure, while insufficient professional knowledge and skills for new production were not extensively viewed as obstacles. However, in order to overcome the obstacles and address the constraints, capacity building-related support is also viewed as important, including agricultural training and lectures as well as support to help solve concrete problems in the field. Moreover, issues such as lack of time, not being informed or lack of permission from the husband, were viewed as challenges to attend capacity building trainings, workshops and meetings. Moreover, the majority of the survey participants mentioned that they never or hardly received any information or advice from extension service on agricultural production.

These insights, related to capacity building for the agriculture sector and in particular within the context of reducing disaster risks and adapting to climate change, even if from a limited number of female farmers are crucial in order to help to better inform design, planning, implementation as well as monitoring and evaluation of capacity building interventions. This may involve better dissemination of information and knowledge about agricultural good practices and technologies available for disaster risk reduction, including capacity building training to field test, validate and potentially replicate and update some of these options as well as a gender mainstreaming intervention to ensure the involvement of both women and men, thereby addressing gender inequality and promoting gender empowerment. The findings from this survey may also be valid in other parts of the country or in the neighbouring countries within the region; however, further research will need to be undertaken.

References and Further Readings

Alexander, D. E. (2013). Resilience and disaster risk reduction: An etymological journey. *Natural Hazards and Earth System Sciences, 13*, 2707–2716. https://doi.org/10.5194/nhess-13-2707-2013.

Allen, K. M. (2006). Community-based disaster preparedness and climate adaptation: Local capacity-building in the Philippines. *Disasters, 30*(1), 81–101.

Altieri, M. A. (2004). Linking ecologists and traditional farmers in the search for sustainable agriculture. *Frontiers in Ecology and the Environment, 2*(1), 35–42.

Agrolink. (2017). Provision of building capacity to reduce the adverse impacts of natural hazards in the agriculture sector.

Anya, M. I., & Ayuk, A. A. (2011). Genetic diversity and climate change: Implications for animal production Systems in Africa. *Asian Journal of Agricultural Research, 5*, 217–222. Available at: https://scialert.net/fulltextmobile/?doi=ajar.2011.217.222.

Bache, I. (1998). *The politics of European Union regional policy. Multi-level governance or flexible gatekeeping?* Sheffield: Sheffield Academic Press.

Bailey, D., & De Propris, L. (2004). A bridge too Phare? EU pre-accession aid and capacity-building in the Candidate Countries. *JCMS: Journal of Common Market Studies, 42*(1), 77–98.

Berger, P. L., & Neuhaus, R. J. (1977). To empower people: The role of mediating structures in public policy (Vol. 1). Aei Pr.

Cairns, B., Harris, M., & Young, P. (2005). Building the capacity of the voluntary nonprofit sector: Challenges of theory and practice. *International Journal of Public Administration, 28*(9–10), 869–885.

CDKN. (2014, March 26). The catalysts of change. Ability of local multi-stakeholder action to catalyse shifts in programme and policy environment towards mainstreaming DRR CCA. Available at: https://cdkn.org/wp-content/uploads/2014/08/CatalystsofChange-ProjectReport.pdf.

Cuthill, M., & Fien, J. (2005). Capacity building: Facilitating citizen participation in local governance. *Australian Journal of Public Administration, 64*(4), 63–80.

Duričin, S., & Bodroža, D. (2013). The impact of drought on yield position of the group of enterprises from agricultural sector. Original scientific paper. Economics of agriculture, 1: 25-37. Available at http://ageconsearch.umn.edu/bitstream/146735/2/2%20-%20Djuricin,%20Bodroza.pdf.

Eade, D. (1997). Capacity-building: An approach to people-centred development. Oxfam.

Elham, A. (2019). Gender mainstreaming in water-energy-food security nexus in arid lands of Egypt. In V. Squires, M.K. Gaur, & S. Attia-Ismail (Eds.), *Drylands: Biodiversity, management and conservation* (pp. 237–258). New York: NOVA Science Publishers.

Emadi, M. H. (2019). Agricultural biodiversity in Middle East and North Africa: Opportunities and challenges. In V. R. Squires, M. K. Gaur, & S. A. Attia-Ismail (Eds.), *Drylands: Biodiversity, management and conservation* (pp. 85–96). New York: NOVA Science Publishers.

European Parliament and the Council of the European Union. (2001). Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32001L0042.

European Parliament and the Council of the European Union. (2007). Directive 2007/60/EC of the European Parliament and the Council of 23 October 2007 on the assessment and management of flood risks. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32007L0060.

European Parliament and the Council of the European Union. (2011). Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32011L0092.

Eurostat. (2019). Unemployment in the EU regions in 2018. News release 75/2019–29 April 2019. Available at: https://ec.europa.eu/eurostat/documents/2995521/9746862/1-29042019-BP-EN.pdf/329a9132-20c0-485b-aa22-b34864c22fde.

Fals-Borda, O. (1984). Participatory action research. *Development: Seeds of Change, 2*, 18–20.

FAO. (2009). *Country pasture forage resource profiles*. Rome: Republic of Serbia.

FAO. (2011a). The role of women in agriculture. ESA working paper no. 11–02, March 2011. Available at: http://www.fao.org/docrep/013/am307e/am307e00.pdf.

FAO. (2011b). The state of food and agriculture 2010–2011: Women in agriculture. Closing the gender gap for development. Available at: http://www.fao.org/3/a-i2050e.pdf

FAO. (2013). Resilient livelihoods. Disaster risk reduction for food and nutrition security. 2013 Edition. Available at: http://www.fao.org/3/a-i3270e.pdf.

FAO. (2015a). Coping with climate change. The roles of genetic resources for food and agriculture. Available at: http://www.fao.org/3/a-i3866e.pdf.

FAO. (2015b). The impact of disasters on agriculture and food security. Available at: http://www.fao.org/3/a-i5128e.pdf.

Feder, G., Murgai, R., & Quizon, J. (2003). Sending farmers back to school: The impact of farmer field schools in Indonesia. The World Bank.

Forino, G., Von Meding, J., & Brewer, G. (2018). Community based initiatives to mainstream climate change adaptation into disaster risk reduction: Evidence from the Hunter Valley (Australia). *Local Environment, 24*, 52–67. https://doi.org/10.1080/13549839.2018.1548010.

Freire, P. (1970). Pedagogy of the oppressed (MB Ramos, Trans.). New York: Continuum, 2007.

Godtland, E. M., Sadoulet, E., Janvry, A. D., Murgai, R., & Ortiz, O. (2004). The impact of farmer field schools on knowledge and productivity: A study of potato farmers in the Peruvian Andes. *Economic Development and Cultural Change, 53*(1), 63–92.

IFAD and UNEP. (2013). Smallholders, food security and the environment. IFAD: Rome. Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=13&ved=2ahUKEwjM88bM1YPfAhUE6aQKHeGDC6EQFjAMegQIAhAC&url=https%3A%2F%2Feuropa.eu%2Fcapacity4dev%2Ffile%2F15391%2Fdownload%3Ftoken%3DrqwVWycG&usg=AOvVaw2UQykPYsyzZej2l8CZE7HY.

IFLA. (2017). Development and access to information 2017. Available at: https://da2i.ifla.org/sites/da2i.ifla.org/files/uploads/docs/da2i-2017-chapter5.pdf.

IPCC. (2012). Managing the risks of extreme events and disasters to advance climate change adaptation. Available at https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/.

IPCC. (2018). Global warming of 1.5°C. Summary for policymakers. Available at: https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf.

Ison, R., & Russell, D. (Eds.). 2000. *Agricultural extension and rural development: breaking out of knowledge transfer traditions*. Cambridge: Cambridge University Press.

Kagawa, F., & Selby, D. (2012). Ready for the storm: Education for disaster risk reduction and climate change adaptation and mitigation 1. *Journal of Education for Sustainable Development, 6*(2), 207–2172.

Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues, 2*(4), 34–46.

McCall, M. K., & Peters-Guarin, G. (2012). *Participatory action research and disaster risk. The Routledge handbook of hazards and disaster risk reduction*. Oxford: Routledge.

McOmber, C., Panikowski, A., McKune, S., Bartels, W. –L., & Russo, S. (2013). Investigating climate information services through a gendered lens. Working paper no. 42. CGIAR research program on climate change, agriculture and food security (CCAFS). CCAFS, Copenhagen.

Ministry of Agriculture and Environmental Protection. (2014). Republic of Serbia. IPARD Programme for 2014–2020. Belgrade revised version by 1 December 2014. Available at http://ipard.co.rs/doc/IPARD%202014-2020.pdf.

Ministry of Environmental Protection. (2017). Second National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change. Available at: https://unfccc.int/sites/default/files/resource/SNC%20Eng_Serbia.pdf.

Mitchell, T., & Van Aalst, M. (2008). Convergence disaster risk reduction and climate change adaptation. Review for DFID. Available at: https://www.preventionweb.net/files/7853_ConvergenceofDRRandCCA1.pdf.

Mitchell, T., Van Aalst, M., & Villaneuva, P. S. (2010). Assessing Progress on integrating disaster risk reduction and climate change adaptation in development processes. Strengthening climate resilience discussion paper 2. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1015.4399&rep=rep1&type=pdf.

ODI. (2009). Social protection, rural development and food security. Issues paper on the role of social protection in rural development. https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/5492.pdf.

Oedoemelan, L. E. (2016). Empowering rural women through access to information and knowledge resource in Abia State, Nigeria. *International Journal of Research in Agriculture and Forestry, 3*(7), 1–7. Available at: http://www.ijraf.org/papers/v3-i7/1.pdf.

Pluskota, A. (2014). The application of positive psychology in the practice of education. *SpringerPlus, 3*(1), 147.

Republic of Serbia. (2014). Agriculture and rural development strategy of the Republic of Serbia for the period 2014–2024. Available at: http://uap.gov.rs/wp-content/uploads/2016/05/STRATEGIJA-2014-2020-.pdf.

Rojas Blanco, A. V. (2006). Local initiatives and adaptation to climate change. *Disasters, 30*(1), 140–147.

Squires, V.R., Gaur, M. K., & Feng, H. Y. (this volume). The critical role of smallholders in ensuring food security, in press.

Squires, V.R., & Gaur, M.K. (this volume). Agricultural productivity and food security: Land degradation and changes over time (in press).

Stephenson, P. (2013). Twenty years of multi-level governance: 'Where does it come from? What is it? Where is it going?'. *Journal of European Public Policy, 20*(6), 817–837.

Tearfund. (2008). Linking climate change adaptation and disaster risk reduction. Available at: https://www.preventionweb.net/files/3007_CCAandDRRweb.pdf.

Thompson, J., & Scoones, I. (1994). Challenging the populist perspective: Rural people's knowledge, agricultural research, and extension practice. *Agriculture and Human Values, 11*(2–3), 58–76.

Tripp, R., Wijeratne, M., & Piyadasa, V. H. (2005). What should we expect from farmer field schools? A Sri Lanka case study. *World Development, 33*(10), 1705–1720.

UN/EU/World Bank Group. (2014). Serbia floods 2014. Belgrade. Available at http://www.ilo.org/wcmsp5/groups/public/%2D%2D-ed_emp/documents/publication/wcms_397685.pdf.

UNDP. (2016). Gender, climate change and food security. Gender and climate change. Available at: http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/UNDP%20Gender,%20CC%20and%20Food%20Security%20Policy%20Brief%203-WEB.pdf.

UNISDR. (2005). Hyogo framework for action 2005–2015: Building the resilience of Nations and Communities to Disasters. Available at: https://www.unisdr.org/2005/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf.

UNISDR. (2009). *Terminology on disaster risk reduction*. Geneva: United Nations International Strategy for Disaster Risk Reduction.

UNISDR. (2015). Sendai framework for disaster risk reduction (2015–2030). Available at: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf.

UNISDR. (2017). Terminology on disaster risk reduction. Available at: https://www.unisdr.org/we/inform/terminology.

United Nations. (2015). Paris agreement. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

USDA Foreign Agricultural Service. (2012). Drought driven declines in Serbian crops increased food prices. Global agricultural information network. Belgrade. Available at https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Drought%20Driven%20Declines%20in%20Serbian%20Crops%20Increased%20Food%20Prices%20_Belgrade_Serbia_8-15-2012.pdf.

USDA. (2015). Serbian agriculture overview and best prospects 2015. Global Agricultural Information Network.

Van den Berg, H. (2004). IPM farmer field schools: A synthesis of 25 impact evaluations. FAO.

Van der Wal, M., De Kraker, J., Offermans, A., Kroeze, C., Kirschner, P. A., & Van Ittersum, M. (2014). Measuring social learning in participatory approaches to natural resource management. *Environmental Policy and Governance, 24*(1), 1–15.

WMO/UNCCD/FAO and UNW-DPC. (2013). WMO/UNCCD/FAO and UNW-DPC. Country Report. Drought conditions and management strategies in Serbia. Initiative on "Capacity Development to support National Drought Management Policy". Belgrade. Available at http://www.droughtmanagement.info/literature/UNWDPC_NDMP_Country_Report_Serbia_2013.pdf.

World Bank data. (2009). *Agriculture, forestry and fishing, value added (% of GDP)*. Serbia.

World Bank. (n.d.). Gender-aware programs and women's roles in agricultural value Chains in Liberia. Available at: https://siteresources.worldbank.org/EXTGENDER/Resources/LibSum-fin-rev1.pdf.